

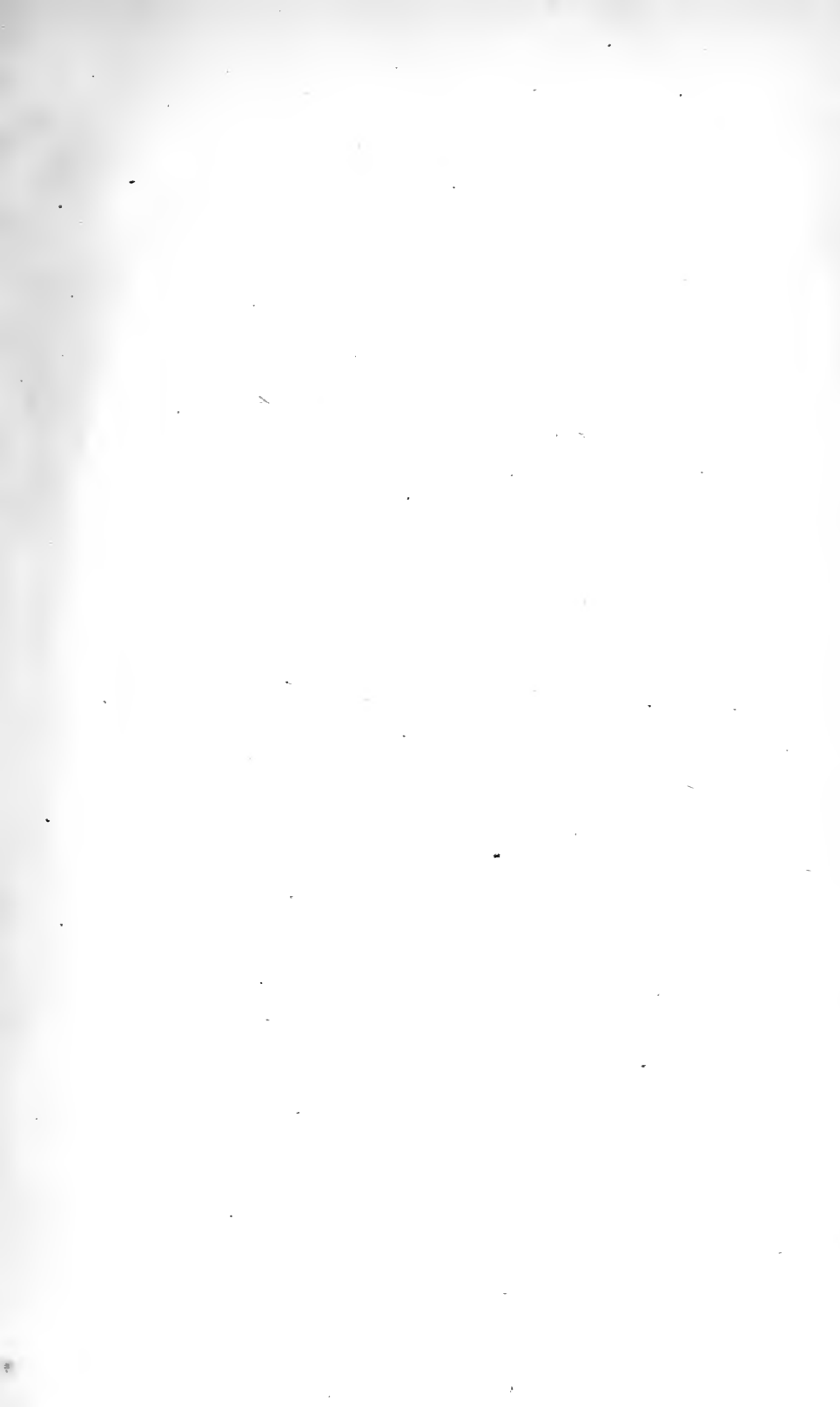
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ANNUAL REPORT  
OF THE  
Cochituate Water Board  
FOR  
1868-9.







*City Document. — No. 55.*

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CITY OF BOSTON.

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*With the compliments of*  
NATH'L J. BRADLEE.

REPORT

OF THE

COCHITUATE WATER BOARD

TO THE

CITY COUNCIL OF BOSTON,

FOR THE YEAR ENDING APRIL 30, 1869.

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H. E. Braden Esq  
July 10 87.  
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CITY OF BOSTON.

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*In Common Council, May 6, 1869.*

ORDERED: That the Cochituate Water Board be authorized to report in print, and that the expense thereof be charged to the appropriation for printing.

Sent up for concurrence.

WM. G. HARRIS, *President.*

*In Board of Aldermen, May 10, 1869.*

Concurred.

BENJ. JAMES, *Chairman.*

Approved May 10, 1869.

NATH'L B. SHURTLEFF, *Mayor.*

A true copy.

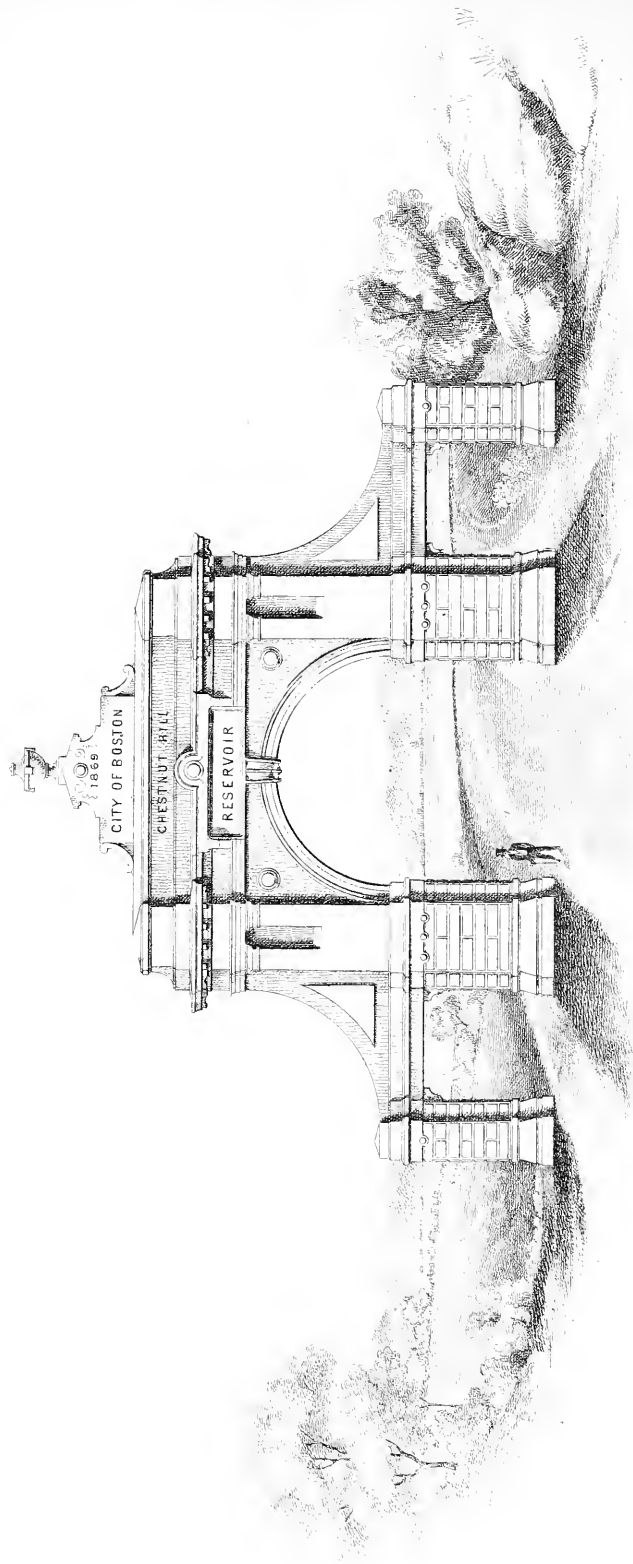
Attest:

S. F. McCLEARY, *City Clerk.*

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ENTRANCE TO THE DRIVEWAY AT THE  
CHESTNUT HILL RESERVOIR.

## CITY OF BOSTON.

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CITY HALL, COCHITUATE WATER BOARD OFFICE,  
MAY 28, 1869.

TO THE CITY COUNCIL OF THE CITY OF BOSTON:

In compliance with the provisions of the City Ordinance, the Cochituate Water Board herewith submit their Annual Report for the year ending April 30, 1869, together with the reports of the Clerk of the Board, City Engineer, Water Registrar, and the Superintendents of the Eastern and Western Divisions, to which they would refer the City Council for the detailed statements of the condition and progress of the water works during the year.

The average height of water at Lake Cochituate above the bottom of the aqueduct has been 11.92 feet, being  $\frac{21}{100}$  less than the previous year, and the rainfall 50.06 inches, being 6.19 less; and although the consumption of the water has been much larger than the previous year, there has been ample to meet all the requirements for which it was introduced. The lake was at high water mark on April 5th, when the water commenced to run over the dam into Sudbury River, and continued to do so until June 18th, with the exception of a few days between April 26th and May 6th, wasting during that time, according to the estimate of the City Engineer, 2,507,684,384 gallons, being 25,000,000 in excess of the previous year. On the completion of the Chestnut Hill Reservoir, a large portion of the water that usually runs to waste at this season of the year, will be saved for use during the dry season.

The average daily consumption has been 14,769,167 gallons, being an increase over the previous year of 1,204,107 gallons.

The least average in any one month was 12,636,000 gallons, in the month of April; and the largest average was in the month of February, when it reached 16,927,000 gallons.

The income from water rates, as it appears by the report of the Water Registrar, has been \$553,744.88; being a gain over the previous year of \$31,613.95.

The estimated income from water rates for the year 1869, is \$600,000.

The expenses have been as follows:—

For current expenses . . . . .	\$164,390 89
Interest and premium on the water debt . . . . .	605,045 92
	<hr/>
	\$769,436 81
	<hr/>

The treasurer has credited the water works for the same year . . . . .	\$609,030 49
	<hr/>

The balance shows an expenditure over and above our receipts of . . . . .	\$160,406 32
---	--------------

Which, with \$737,770.00 expended on the Chestnut Hill Reservoir during the year, and \$280,808.84 expended for laying the main and service pipes in the Highland District, adds to the cost of the Water Works . . . . .	\$1,178,985 16
Cost of the works to May 1, 1868, including interest and premium on debt, less amounts received for water-rates, rents, etc. . . . .	\$7,677,702 55
	<hr/>
Making the total cost to May 1, 1869, . . . . .	\$8,856,687 71

It will be seen by the above figures that the income has not been sufficient to meet the interest on the debt and the current expenses, by a little over \$160,000, being over \$48,000 in excess of the deficiency of the previous year. Under these circumstances, the Board would recommend that a charge be made

for the use of the fire hydrants, as is done in other cities. In this way the income can be increased nearly sufficient to meet the interest and expenses, and that any further deficiency should be made up by an increase of the water rates, or by direct taxation. The amount already added to the water debt by the excess of interest and expenses over the receipts has been \$1,445,331.72.

#### EASTERN DIVISION.

This Division comprises that portion of the works lying east of the Brookline Reservoir, including the distributing pipes and reservoirs in the city.

More work has been performed in this department during the past year, than in any other year since the introduction of the water in 1848, and the Superintendent, Mr. Jones, deserves credit for the manner in which he has executed the same.

#### MAIN AND SERVICE PIPES.

During the year there have been laid fifty-three thousand five hundred and sixty-seven feet of main pipe, being forty thousand nine hundred and seventy-one feet more than was laid the previous year; making the total amount of pipe laid since the commencement of the works a little over one hundred and fifty-two miles, to which are connected fifteen hundred and eleven gates, and seventeen hundred and fifty-five hydrants, one hundred and eight of the latter being of the "Lowry" patent, which have been used in the Highland District to test their efficiency.

The number of service pipes laid, has been thirteen hundred and forty-two, being a gain over the previous year of six hundred and nineteen. Total to May first, twenty-eight thousand two hundred and sixty-six.

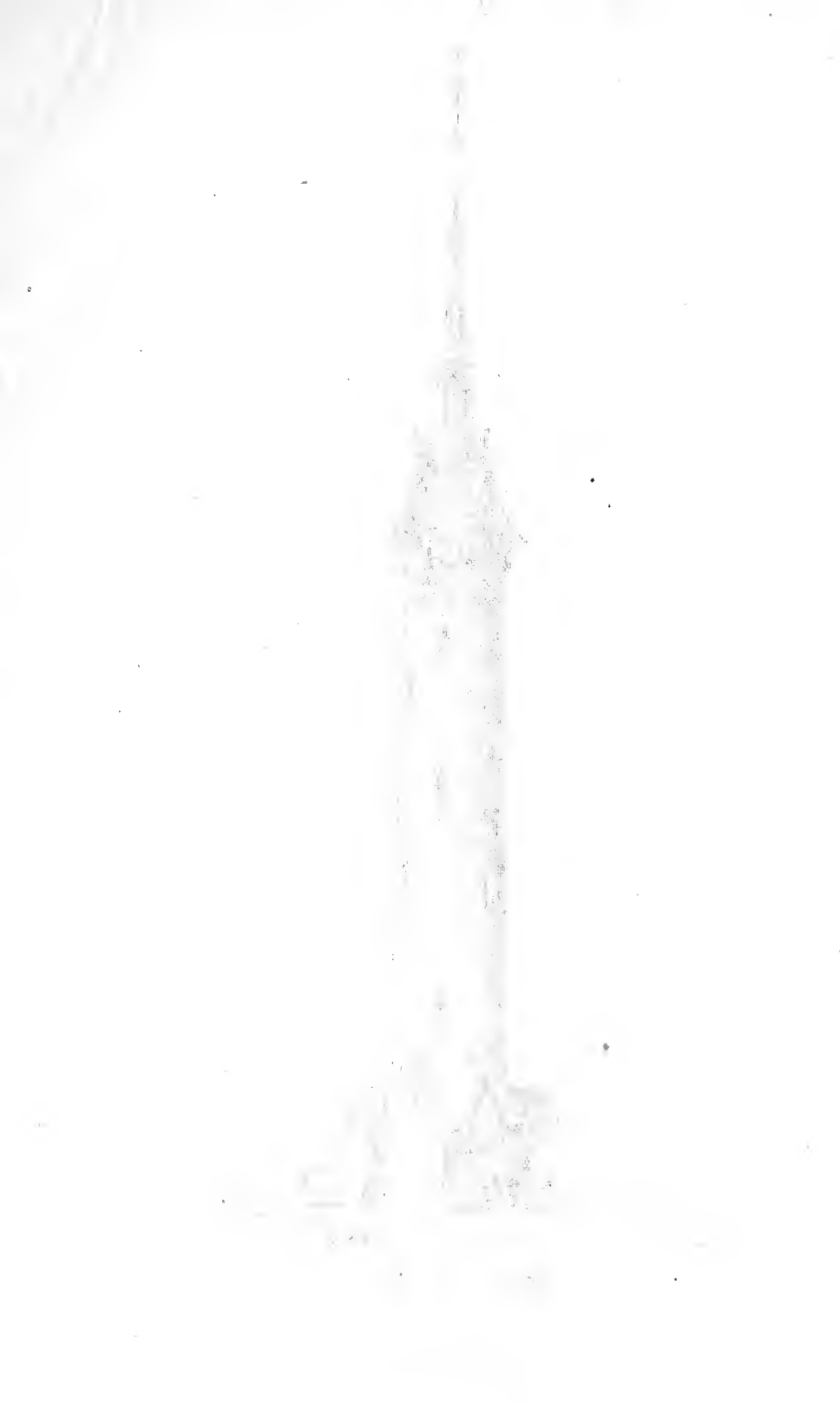
The number of repairs made during the year has been but five hundred and thirty-one, being seventy-eight less than the

previous year; this is rather remarkable when we consider the large amount of pipe which has been added to the works, the number being less than in any year since 1864.

#### HIGHLAND DISTRICT.

The most important work in this division, has been the laying of the main and service pipes in the Highland District, which has been pushed forward as fast as the work could be done to advantage. Over eight miles of main pipe were laid, and over two miles of service pipe, to which were attached the necessary gates and fire hydrants. The water was introduced into these pipes for the first time on 26th of October, 1868. The question as to the best method of supplying the high service of this district, has been unanimously decided by the Board in favor of the stand-pipe system; this decision was arrived at after a thorough examination of the whole subject. The Committee of this Board who had it in charge visited Philadelphia, in company with the City Engineer, where this method is adopted in several of its districts, and were very kindly received by the Chief Engineer of the Fairmount Water Works, Frederick Graff, Esq., who gave them much valuable information in relation to stand-pipes, and explained the advantages as well as the disadvantages of the system. On their return from Philadelphia, the Committee visited the location for the stand-pipe now erecting for the Croton Water Works in New York, and through the kindness of the Resident Engineer of the work, William L. Dearborn, Esq., they were enabled to inspect the plans for this structure, which, when completed, will be one of the finest in the country, as a large amount will be expended for architectural effect.

The location for the stand-pipe in the Highland District is to be on the lot known as the "Old Fort," situated on Beech Glen Avenue on the south, and Fort Avenue on the north; the base of the shaft will be about one hundred and fifty-eight feet



1. The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is not only a scientific one, but also a philosophical one. The author discusses the various theories of the origin of life, and shows that the most plausible one is the theory of spontaneous generation.

2. The second part of the paper is devoted to a detailed discussion of the theory of spontaneous generation. The author shows that this theory is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor. The author also shows that the theory of spontaneous generation is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor.

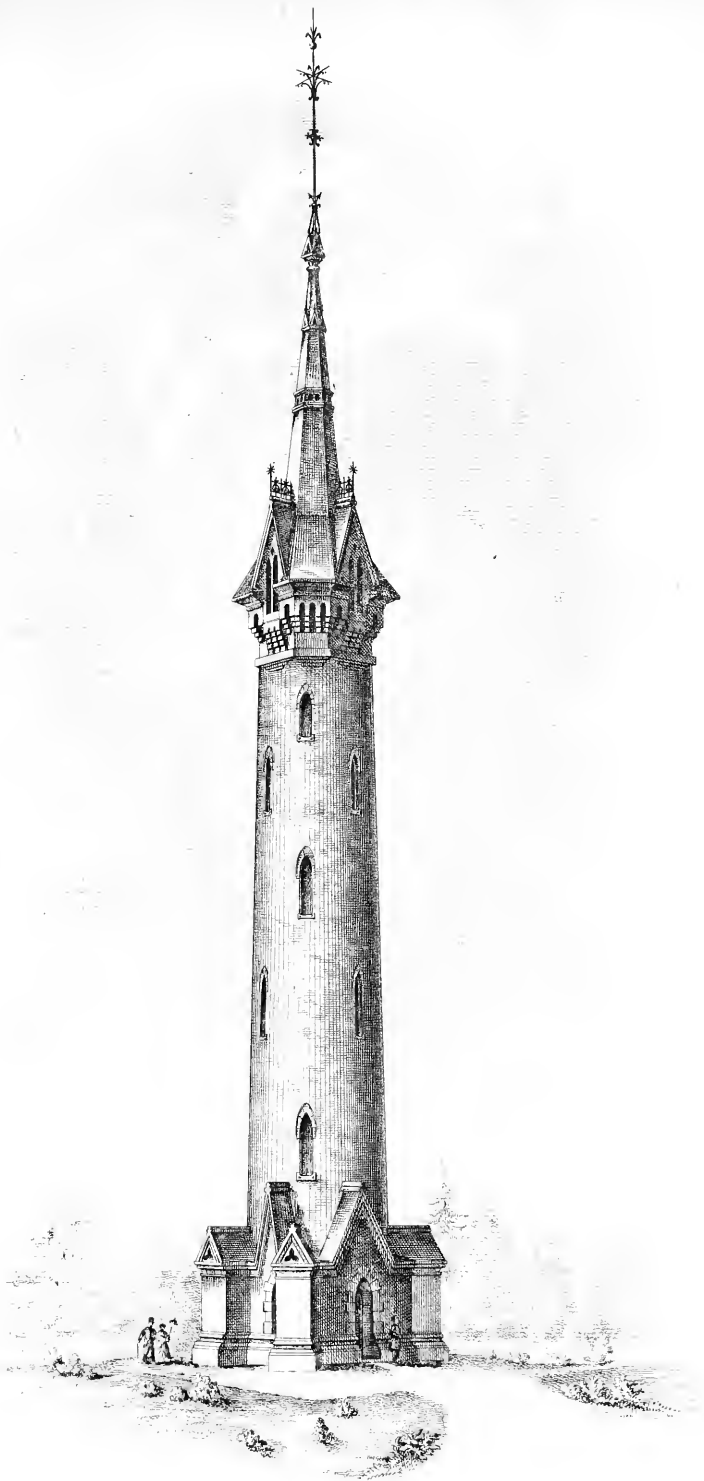
3. The third part of the paper is devoted to a detailed discussion of the theory of spontaneous generation. The author shows that this theory is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor. The author also shows that the theory of spontaneous generation is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor.

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6. The sixth part of the paper is devoted to a detailed discussion of the theory of spontaneous generation. The author shows that this theory is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor. The author also shows that the theory of spontaneous generation is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor.





STAND PIPE  
BOSTON HIGHLANDS.



above tide marsh level; the interior pipe is to be made of boiler-iron, five feet in diameter, of equal size throughout its length of eighty feet; between the pipe and the exterior walls will be a space of about three feet, in which there will be a spiral iron staircase leading to a lookout at the top. The exterior walls are to be of brick, with granite trimmings; the lower portion or base of the shaft is finished with four pediments, with buttresses at the angles; above this it is circular to within ten feet of the roof, when it projects and is octagonal in form, the whole being crowned with a steeple. The total height from the sidewalk which surrounds it is one hundred and seventy feet. The contract for the iron work was awarded to the Boston Machine Company, and the masonry to Messrs. Standish & Woodbury. The whole structure will be completed by the first of October next, at a cost of not exceeding \$20,000.

The location for the engine-house and pumps is on Pyncheon and Elmwood Streets, the lot having a frontage of about forty feet, running back to the new station-house, and contains 5,563 square feet. The contract for the pumping engines was also awarded to the Boston Machine Company, their bid being the lowest received. Before deciding, however, their plans were submitted to competent experts, whose reports were perfectly satisfactory. The cost of the pumping works in complete running order, will be \$37,000; the building in which it is to be located is to be a plain brick building without any architectural pretensions; the contracts for this building have not as yet been awarded; the total cost of the high service system will not probably exceed \$80,000. The arrangement, size and location of the pipes for this service are fully described in the annexed report of the City Engineer.

#### DISTRIBUTING RESERVOIRS.

Beacon Hill Reservoir. — The maximum high water line of this reservoir is 121.53 feet, and the average height of water

has been 119.11 feet, being  $\frac{25}{100}$  less than the previous year.

South Boston Reservoir. — The maximum high water line is 122.86 feet, and in the East Boston Reservoir, 107.60.

The City Engineer in speaking of these says: "The water is let into these reservoirs only at long intervals, and is then shut in, to be drawn out only in case of an extreme emergency, such as an accident to the main, or a destructive conflagration. In the original plan it was intended that these reservoirs should be connected with the general circulation, thus increasing the efficiency of our whole system of distribution, but this result, however desirable, must be postponed until an independent supply for East Boston shall have been procured, and an additional main pipe laid to South Boston, both of which measures are of far more importance to those localities than even the extension of the reservoirs themselves."

The water was drawn off from the East Boston Reservoir on the 4th of April, for repairs, as spoken of in our last annual report, and the work was continued until December 24th, when the weather put a stop to further progress. At this time it was so far completed that the water was let in to the depth of twenty feet; this amount of water having been kept in during the winter, without the least indication of leakage, the work was again resumed this spring and the whole will be completed before the 1st of July. On its completion, the Board propose to re-grade the slopes and erect an iron fence on the street lines and a suitable wooden fence on the boundary lines, between adjoining estates.

An act of the Legislature, authorizing the widening of the draw of Warren Bridge, will make it necessary to enlarge the syphon-pipe at this place. The box enclosing the twenty-inch main under the sidewalk of this bridge will have to be renewed before the close of another year, as it is now very much decayed.

## WESTERN DIVISION.

This Division comprises the lake and that portion of the works lying between the lake and the gate-house at Brookline Reservoir. Owing to the high state of the water at the lake the past year, it has been impossible to continue the construction of the slope walls on the margin of the lake, or to build the second filter dam at Pegan Brook; the work will be continued this year if the water should be sufficiently low during the summer or fall to permit it to be done.

The great freshet of February 15th, washed away a portion of the embankment over the conduit on the "Collins Farm," in Newton, and we cannot but return our thanks to Mr. Collins, who, on discovering the accident, immediately telegraphed the fact to the Board, and thus prevented what might have been a very serious damage.

During the year the work of putting down stone posts to prevent encroachments on the land owned by the city, and for perpetuating our bounds on the margin of the lake and on the line of the conduit, has been continued, two hundred and fifty-nine having been set, and this year we are in hopes that the rest of the bounds will be permanently marked.

On April 23d, the annual examination of the conduit was made, and for the first time since the construction of the works, the whole line, a little over fourteen miles, was examined in one day; this was accomplished by three parties. The City Engineer and three others entered at the lake, and came through to Charles River, a distance of nearly eight miles. Mr. Wightman, the Resident Engineer of Chestnut Hill, examined that portion between Newton Centre and Charles River, a distance of about three miles. Mr. Stanwood examined from the Brookline Reservoir to the Waste Weir, in Newton Centre, a distance of three and three-fifths miles. In that portion between the Chestnut Hill Reservoir and Newton Centre, a distance of nearly

three miles, he was accompanied by His Honor the Mayor, several members of the Board of Aldermen, the Committee on Water of the City Council, and six members of this Board; the general condition of the conduit was found to be the same as at the last examination. The full particulars of the various cracks will be found in the Engineer's report.

The Brookline Reservoir, as we stated in our last annual report, needs a thorough cleaning out. But it cannot be done until the Chestnut Hill Reservoir is completed, as it would take several days to accomplish the work, there being no means of keeping up the supply in the city during that time, the capacity of the Beacon Hill, South and East Boston Reservoirs not being sufficient to supply the city for *one day*, as the total capacity *when full* is but 15,779,023 gallons. The gate-house at the reservoir needs repairs, which cannot be done, for the same reason.

#### CHESTNUT HILL RESERVOIR.

During the past year considerable progress has been made towards the completion of this reservoir. During the months from May to October, nearly the whole force were employed upon the upper or Lawrence Meadow section, as it was decided to complete that basin in order to fill it, and have it ready for use during the dry season of this year; and on Monday, the 26th of October, the water was let in and continued to flow for sixteen days when it was half filled; the gates were then closed, as a leak was discovered in the dam which separates the upper from the lower basin. After several experiments were tried to prevent this leak, it was decided to build a new water-tight dam outside of the present embankment; work was immediately commenced on this dam, and we are happy to state that it is perfectly tight as far as it is finished; and we are now in hopes that the whole will be completed within six weeks, so that the upper basin can be immediately used as a source of supply;

MAP OF  
CHRISTIANITY IN AFRICA  
FROM THE YEAR 1800



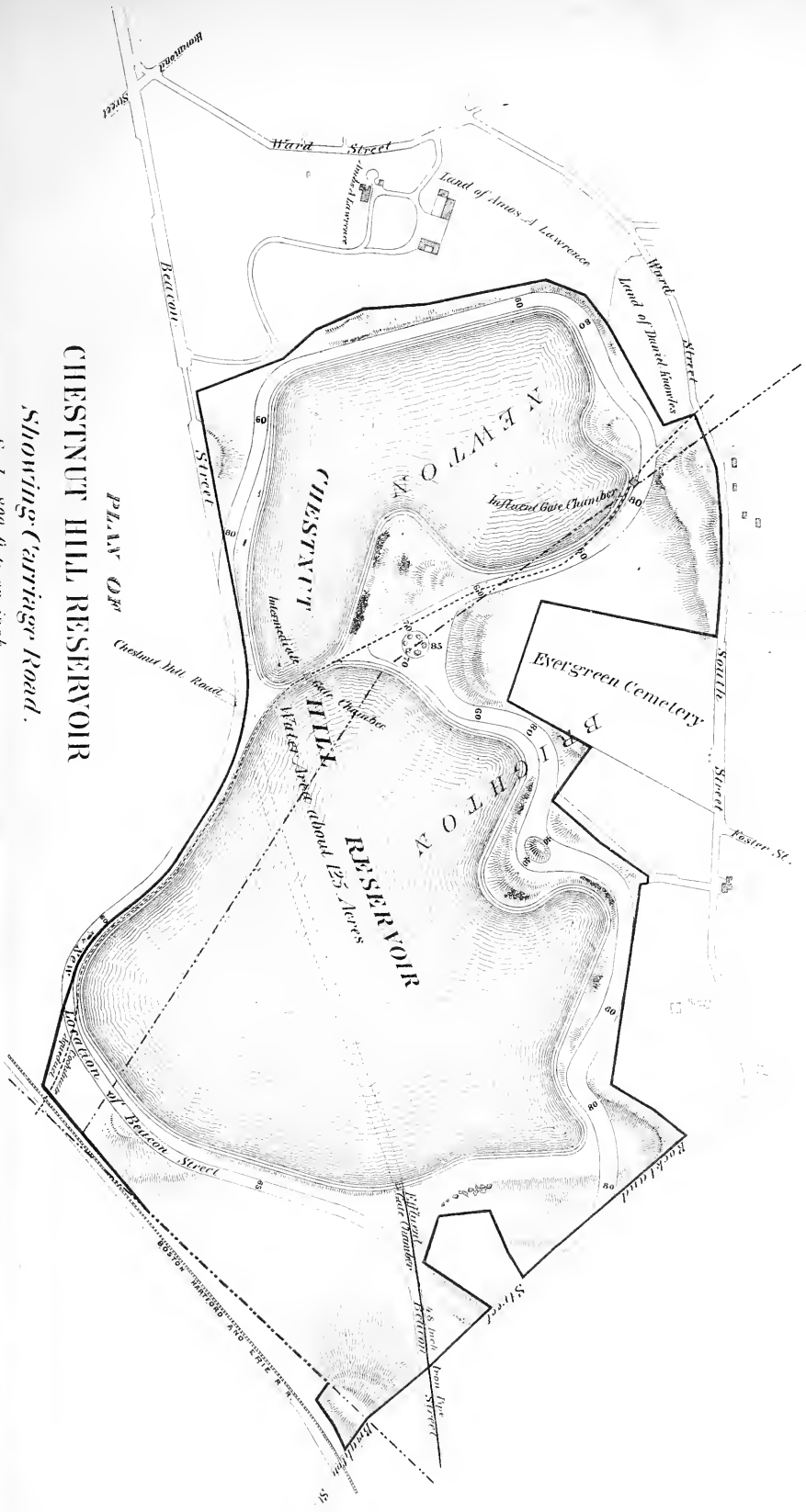




# PLAY OF CHESTNUT HILL RESERVOIR

Showing Carriage Road.

Scale, 800 ft. to an inch.





this work was not calculated upon, and of course has added greatly to the cost of the reservoir.

The influent and intermediate gate-houses, have both been completed and have fully met our expectations, and the gates work to our entire satisfaction. The labor of obtaining a foundation for the effluent gate-house has been much more than we anticipated, being obliged to remove a very large body of quicksand, the quantity as estimated by Engineer, being 35,000 cubic yards. Considerable damage was done to this portion of the work by the great freshet of February 15th, the temporary flume which carries off the surface water from the basin having been washed away, and the trench was soon filled with twenty feet of water. Several days were occupied by the steam fire engines and a Gwynn pump in pumping it out, before the work could again be renewed.

During the winter, the roadway was all graded and is now nearly completed. Rockland Street has also been widened nearly its entire length, that portion in front of our land having been done at the expense of the City, and the rest by the Town of Brighton.

This road has already become a favorite place of resort. The number of visitors varies from five to ten thousand a week; on some pleasant Sunday afternoon it has been estimated that nearly three thousand carriages have driven over it. On the completion of this great work it will undoubtedly be the most beautiful drive in this vicinity.

The gateway at the main entrance to the driveway on Rockland Street, has been contracted for and will be completed by the first of October.

On the eleventh day of January the excavations were commenced on the pipe route for the forty-eight inch main to connect the Chestnut Hill Reservoir with the iron mains at Boylston Street, a short distance from the Brookline Reservoir, and before the first of April, 6,350 feet had been laid. The remain-

ing portion will be completed, and the connections made before the first of September. An account in detail of the amount of labor performed on this reservoir will be found in the very full report of the Resident Engineer.

WATER REGISTRAR'S DEPARTMENT.

By reference to the report of the Water Registrar, it will be seen that the total number of water takers for the year 1869, is twenty-nine thousand seven hundred and thirty-eight, being an increase over the previous year of sixteen hundred and thirty-four; of this number twenty thousand six hundred and forty-four are for dwelling houses, forty-six hundred and twenty-six for stores and shops, ten hundred and eighty-two are for stables, and the remaining thirty-three hundred and eighty-six are for various purposes.

There have been six hundred and eighty cases where the water has been turned off for non-payment of the water rates, being seventy more than the previous year; of this number ninety-five are still remaining off, being twenty-one less than last year.

The number of meters now applied, is ten hundred and twenty-one, being an increase over the previous year of one hundred and twenty-six; and it gives us pleasure to state that we have had fewer complaints from the meter system this year than in any year since their application.

Respectfully submitted,

NATHANIEL J. BRADLEE,  
BENJAMIN JAMES,  
ALEXANDER WADSWORTH,  
FRANCIS A. OSBORN,  
GEORGE LEWIS,  
JOSEPH M. WIGHTMAN,  
CHARLES H. ALLEN.

## REPORT OF THE CLERK.

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OFFICE OF THE COCHITUATE WATER BOARD,  
BOSTON, May 5, 1869.

NATHANIEL J. BRADLEE, Esq.,

*President of the Cochituate Water Board:*

SIR: The following is a statement of the Expenditures and Receipts of this department for the year commencing May 1, 1868, and ending April 30, 1869:

### EXPENDITURES.

Blacksmith shop, for stock, etc.	. . .	\$471 90
Plumbing shop     "     "	. . .	84 75
Raising water pipes on Tremont Street	. . .	1,772 12
Land and water rights	. . . . .	2,728 16
Stable	. . . . .	2,746 31
Taxes	. . . . .	236 86
Tools	. . . . .	1,569 69
Travelling expenses	. . . . .	114 78
Fountains	. . . . .	457 42
Laying main pipes, etc., for stock, etc.	. . .	358 18
Postage and expresses	. . . . .	66 09
Reservoirs — Beacon Hill	. . . . .	607 75
"     East Boston	. . . . .	39,139 86
"     South Boston	. . . . .	427 43
"     Brookline	. . . . .	1,699 63
Aqueduct repairs	. . . . .	354 76
<i>Amount carried forward,</i>	. . . . .	<u>\$52,835 69</u>

<i>Amount brought forward,</i>	\$52,835 69
Printing (including Water Registrar's and Superintendent's)	2,570 17
Rent of Eastern Avenue Wharf for tow-boats	2,000 00
Telegraph to the reservoirs and lake	1,320 00
Repairing boxes on bridges	1,563 03
Stationery (including Water Registrar's and Superintendent's)	487 38
Salaries (including clerks and inspectors in Water Registrar's department)	13,738 66
Main pipe	7,193 21
Service pipe	15,271 73
Off and on water	6,581 37
Extra inspectors	9,140 25
Wages, — laying main pipe	3,044 23
“ “ service pipe, etc.	6,850 90
“ blacksmith shop	862 00
“ plumbing shop	44 25
“ proving yard	3,515 39
Upper yard, finishing buildings, etc.	943 36
Miscellaneous expenses	884 38
Meters	8,443 94
Maintaining meters	2,035 20
Repairing main pipe	1,234 00
“ service pipe	4,965 07
“ hydrants	1,572 19
“ streets	5,396 99
“ stopcocks	578 05
Stopcocks	1,797 65
Hydrants	2,101 79
Lake	2,463 35
Proving yard, stock, etc.	1,614 31

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*Amount carried forward,* . . . \$161,048 54

# REPORT OF THE WATER BOARD.

17

<i>Amount brought forward,</i>	.	.	.	.	\$161,048 54
Hydrant and stopcock boxes	.	.	.	.	986 78
Tolls and ferriage	.	.	.	.	46 07
Oil	.	.	.	.	93 00
Carting	.	.	.	.	216 50
Chestnut Hill Reservoir	.	.	.	.	737,770 00
Wards 13, 14, 15	.	.	.	.	280,808 84
Amount drawn for the drive-way around Chestnut					
Hill Reservoir	.	.	.	.	37,388 43
Total drawn for by the Board					<u>\$1,218,358 16</u>

And which is charged as follows:

To Chestnut Hill Reservoir	.	\$737,770 00
Water Works	.	162,390 89
Drive-way	.	37,388 43
Wards 13, 14, 15	.	280,808 84
		<u>\$1,218,358 16</u>
Amount charged Water Works	.	1,180,969 73

## RECEIPTS.

*Cash paid City Treasurer.*

Received for grass and pasture,	\$150 00	
" " fines for waste, etc.,	1,176 00	
" " off and on water,		
for repairs .	1,514 25	
" " pipe, laying, repair-		
ing, etc. .	11,959 75	\$14,800 00
Net amount to Water Works	.	<u>\$1,166,169 73</u>
<i>Amount carried forward,</i>	.	<u>\$1,166,169 73</u>

<i>Amount brought forward,</i>	.	.	.	.	\$1,166,169	72
Amount drawn for Water Works not including						
Chestnut Hill Reservoir or Wards 13, 14, 15,					162,390	89

## EXTENSION OF THE WORKS.

Main pipe	.	.	.	.	\$7,193	21
Wages laying main pipe	.	.	.	.	3,044	23
Laying main pipe, stock, etc.	.	.	.	.	358	18
					\$10,595	62
<hr/>						
Amount of expenses from April 30, 1868, to						
May 1, 1869	.	.	.	.	\$151,795	27

*Expenditures and Receipts on Account of the Water Works, to  
May 1, 1869.*

Amount drawn by Commissioners	.	.	.	.	\$4,043,718	21
“ “ Water Board, in 1850	.	.	.	.	366,163	89
“ “ Cochituate Water Board,						
from January 1, 1851, to May 1, 1868	.	.	.	.	2,850,427	64
Amount drawn from April 30, 1868, to May 1,						
1869, for Water Works	.	.	.	.	1,180,969	73
					\$8,441,279	47

Amount paid the City Treasurer						
by the Commissioners	.	.	.	.	\$47,648	38
Amount paid by Water Board,						
1850	.	.	.	.	8,153	52
Amount paid by Cochituate Water						
Board, to May 1, 1868	.	.	.	.	173,354	76
Amount paid from April 30, 1868						
to May 1, 1869	.	.	.	.	14,800	00
					\$243,956	66
<i>Balance</i>	.	.	.	.	\$8,197,322	81



Net amount drawn from the Treasurer, by the Commissioners and Water Boards, for the Water Works . . . . .	\$8,197,322 81
Gross payments (including interest, premium, etc.) for account of the Water Works . . .	\$15,929,044 15
Gross receipts . . . . .	7,072,356 44
Net cost to the city, May 1, 1869 . . .	\$8,856,687 71

SAM'L N. DYER,

*Clerk Cochituate Water Board.*

### COST OF THE WORKS TO MAY 1, 1869.

#### WESTERN DIVISION.

Amount paid William H. Knight for the lake .	\$100,000 00
Amount paid William H. Knight for the facto- ries, \$50,000; less amount on account of the sale of land and machinery, and insurance at the time of the fire . . . . .	20,818 22
Expense of raising the lake two feet, including damages . . . . .	28,002 18
Cost of roads, bridges and swamps . . . .	38,332 48
Gate-house at the lake . . . . .	29,907 12
Dam at the outlet of the lake . . . . .	8,458 20
Dudley Pond, lower dam, and making connec- tions with the lake . . . . .	18,982 23
New dam, and improvements at the lake . .	12,647 97
Total cost of lake dep't, <i>not including land</i> , . . . . .	\$257,148 40
<i>Amount carried forward</i> , . . . . .	\$257,148 40

<i>Amount brought forward,</i>	.	.	.	\$257,148 40
Land and land damages, less				
credit for land sold	.	\$226,010	97	
Constructing the Brick Conduit		817,717	73	
Brookline Reservoir,				
Land	.	\$58,418	93	
Brookline Reservoir,				
Construction	.	108,301	92	
Brookline Reservoir,				
Gate-House	.	33,356	36	
Compensating Reservoirs, less				
amount received when sold,		66,859	80	
Engineering Expenses on the				
Western Division	.	69,570	56	
Miscellaneous Expenses on the				
Western Division	.	31,474	41	
Payment on account of the				
Chestnut Hill Reservoir	.	1,563,778	27	
				2,975,488 95
Total Cost of Western Division				\$3,232,637 35

## EASTERN DIVISION.

Main and Service Pipes	.	\$2,751,869	21	
Beacon Hill Res-				
ervoir, Land	.	\$145,107	10	
Beacon Hill Reser-				
voir, Construc'n,		368,426	11	
		513,533	21	
South Boston Res-				
ervoir, Land	.	55,103	23	
S. Boston Reser-				
voir, Construc'n,		35,804	87	
		90,908	10	
<i>Amount carried forward,</i>		\$3,356,310	52	

<i>Amount brought forward,</i>	\$3,356,310 52	
East Boston Res-		
ervoir, Land .	\$23,862 50	
East Boston Res-		
ervoir, Construc'n,	42,240 59	66,103 09
Engineering Expenses on the		
Eastern Division . .		31,403 02
Machine Shop and Pipe Yards,		40,811 49
Hydrants and Stopcocks . .		61,935 00
Proving Pipes . . . .		35,983 96
Meters . . . . .		103,973 79
Miscellaneous Expenses on the		
Eastern Division . .		201,388 93
Payment on account of Wards		
13, 14, 15 . . . . .		280,808 84
		<hr/>
Total Cost of Eastern Division		\$4,178,718 64
Total Cost of Western Division,	\$3,232,637 35	
Total Cost of Eastern Division,	4,178,718 64	
	<hr/>	
Total Eastern and Western .		7,411,355 99
Expenses of Carrying on the		
Works . . . . .	\$1,115,313 58	
Interest paid, after deducting		
total Income received . .		330,018 14
		<hr/>
Excess of Expenses and Inter-		
est over Income . . . .		1,445,331 72
		<hr/>
Total cost on May 1, 1869, over and above the		
Income . . . . .		\$8,856,687 71
		<hr/> <hr/>

## REPORT OF THE CITY ENGINEER.

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OFFICE OF CITY ENGINEER,  
CITY HALL, BOSTON, May 5, 1869.

N. J. BRADLEE, Esq.,

*President Cochituate Water Board.*

SIR: In compliance with the Ordinance relating to the Department of Engineering, I respectfully present the following report relative to the Water Works.

### EASTERN DIVISION.

On page 52 is presented the average monthly heights of water in the Reservoir at Brookline, and in the Beacon Hill, South Boston and East Boston Reservoirs, from 1861 to 1868 inclusive; said heights being expressed in feet and decimals above "tide marsh level," or ordinary high tide. This table is presented now more as a matter of form than for any purpose of practical utility, as it does not present, by comparison of the relative heights of the water in the Brookline Reservoir with that of the water in the City reservoirs, the actual loss of head in the various parts of the city, except in the very limited section connected with the high service and supplied through the Beacon Hill Reservoir. The reservoirs at South Boston and at East Boston are not of any value for two of the objects for which they were designed, viz: the equalization of the head or pressure and the maintenance of a more steady and uniform flow of water through the pipes. The water is let into these reservoirs only at long intervals (in the case of South Boston, only once during the year 1868), and is then shut in to be

drawn out only in case of an extreme emergency, such as an accident to the main, or a destructive conflagration. The average depth of water stored in these reservoirs for the past eight years has been thirteen feet ten inches in the East Boston, and eight feet three inches in the South Boston; these depths being equivalent to a supply of 2,157,000 gallons in the former, and 3,132,950 gallons in the latter, or less than two days supply for each place in case of a serious break in the main line leading to each place.

If it is desirable to record and publish annually, a table exhibiting the loss of head from Brookline Reservoir to various parts of the city, the most reliable method would be to establish pressure-gauges at various points connected with the principal mains. These gauges would indicate the exact head at the several points of connection at all hours of the day or night. They could readily be made to be self-recording, and would not therefore require a daily personal examination at stated times.

The importance of returning to the original plan of keeping the several City reservoirs connected with the general circulation, thus increasing the efficiency of our whole system of distribution, is undoubtedly fully appreciated by your Board; but this result, however desirable, must be postponed until an independent supply for East Boston shall have been procured, and an additional main pipe laid to South Boston, both of which measures are of far more importance to those localities than even the existence of the reservoirs themselves.

#### BEACON HILL HIGH SERVICE.

The question of supplying the high service of Beacon Hill has frequently engaged the attention of former Boards and Engineers, and the present system seems to be the best that could be devised without resort to pumping; but it is, nevertheless, far from being efficient or reliable. As now arranged, the exclusive use of Beacon Hill Reservoir, and about five miles of

thirty-inch pipe are devoted to the high service section, which strictly comprises not over fifty acres, and about fifty acres more of the contiguous low service. The population now supplied by the thirty-inch main does not exceed 15,000, and, as the requirements are almost, if not quite, exclusively domestic, it would appear that this entire line of pipe and the costly reservoir structure are used to furnish a supply of less than a million gallons per day, or about one fifteenth of the entire demand. It must be evident that the present system of keeping up the head or pressure on Beacon Hill is not only, as before said, unreliable and imperfect, but about as extravagant a system as could be devised. As stated before, the high service proper of Beacon Hill does not cover an area of over fifty acres; and, as this area is already fully covered with dwellings, the population may be said to have reached its highest limit, and its requirements may be safely computed.

The plan which your Board has adopted for the high service in Roxbury, and which is subsequently described in this report, would seem to furnish the true solution to all the difficulties in this section.

For a very moderate outlay, small pumping engines, a stand-pipe, and all the necessary connections could be furnished, which would deliver the requisite amount of water for this section, at such an elevation as would supply the most elevated houses in as thorough and efficient a manner as in any part of the city, and at the same time enable the thirty-inch pipe and the Beacon Hill Reservoir to be chiefly devoted to the general service, thus greatly relieving the other mains, and increasing the head or pressure in the other sections of the city.

Connections could then be made between the thirty and thirty-six inch mains at various points, which would be of great advantage to South Boston and the southerly wards of the city.

The improvements above suggested are so intimately connected with the whole question of the future supply and distri-

bution of water, that I beg leave to call the attention of your Board to the importance of giving to them an early consideration.

#### EAST BOSTON RESERVOIR, ETC.

The East Boston Reservoir has been empty during most of the past year. The water was drawn out April 4th, and repairs to prevent the leakage which has been so troublesome in years past, were at once commenced according to the plan described in my last report. It was confidently anticipated that the entire work would be finished before the close of the year 1868, but the limited and confined space in which the work had to be done, and the consequent shifting of material, hindered the progress of the work very materially. The work was prosecuted until December 24th, when it was abandoned on account of the cold weather. The entire bottom and the slide-slopes to within a few feet of high-water mark were then finished, the rubbish from the interior removed, and, on the 25th of December, water was let in to the depth of 20 feet. Since that time, and until the resumption of the work of repairs, the water has been kept at about that height, and no sign of leakage was manifest. In fact, instead of the water subsiding, as was previously the case, the additional accumulation from the rain fall has made it necessary to draw it down on several occasions.

Work has already been resumed and the interior will be finished probably by July.

Great credit is due to the Superintendent of the Eastern Division, Mr. Jones, and to his efficient assistant on this work, Mr. Tucker, for the very faithful manner in which the plans for the repairs for this reservoir, adopted by your Board, have thus far been executed.

When the present repairs of the interior are finished, it will be found necessary to re-grade a portion of the outer slopes, and rebuild the fence. The present wooden structure was erected in 1850, and is in quite a dilapidated condition. The

new fence should be of iron, and placed upon our true boundary lines. The present fence does not enclose our whole lot, there being about an acre and a quarter outside.

Surveys are now being made to fix the exact boundaries of the lot, and levels taken to determine the best manner of grading the same, and the adjoining streets.

Repairs are needed on that part of the structure at the Warren Bridge, which covers the twenty-inch main to East Boston; but it will be desirable to await the action of the city of Charlestown, in making their portion of repairs in the vicinity, as the work can be done more advantageously by co-operation. In view of the proposed widening of the draw at this bridge, and the consequent necessity of enlarging the syphon pipe at this place, it will become necessary to make some arrangement by which a supply for East Boston may be obtained, by a connection with either the Charlestown or Chelsea main. The present contingency would seem to afford a convenient opportunity for perfecting arrangements with the city of Charlestown for a permanent supply to East Boston.

#### EXTENSION OF THE WORKS IN ROXBURY.

The extension of the works in Roxbury has progressed as well as could be expected, considering the difficult nature of the ground to be opened. At the date of the last annual report, work had been commenced by the Superintendent in the vicinity of Mount Pleasant, and in Highland Street, and, until the close of the season, the prosecution of it was uninterrupted, though somewhat delayed in certain quarters by tardiness in the delivery of the larger sizes of pipe and branches.

The Superintendent's Report will show the amount of pipe laid, the location and size; also the number of gates and hydrants set. The general plan of distribution for this district, as sketched in my last report has been followed with slight



modification. The twenty-four inch main, and the twelve-inch distribution pipe alongside, have been laid from Tremont Street through Washington Street, Eliot Square, and Dudley Street, to the junction of Dudley and Hampden Streets, connecting there with the twelve-inch pipe in Hampden Street. A connection has also been made between the twenty-four inch main and the twelve-inch pipe which was laid last year in Washington Street and Guild Row; thus linking the old distribution with the new at three points — Tremont Street, Guild Row and Hampden Streets.

#### HIGH SERVICE IN ROXBURY.

It was determined by surveys made during the previous year that a very considerable area of this district was entirely above the reach of the Cochituate water by gravitation delivery, and, as a matter of course, a portion of the contiguous territory is so situated that the supply would be necessarily intermittent and imperfect.

During the past year levels were taken to determine the elevation of all the door-sills above a plane of eighty feet above "tide marsh level," with a view of ascertaining the location and extent of the districts requiring a special supply. It was found that there were four separate districts requiring a special high service which may be designated respectively as the "Highland Street, or Fort district;" the "Tommy's Rocks district;" the "Parker Hill district;" and the "Seaver Hill district."

The first-named district comprises about eighty acres, the centre of which is very near the junction of Highland and Cedar Streets, and includes within its limits Norfolk Street, Lambert Street and Avenue, Millmont Street, Dorr Street, Cedar Street from Centre Street to Shawmut Avenue, Cedar Square, Hawthorne Street, part of Thornton Street, Ellis Street, Beech Glen Avenue, Fort Avenue, Linwood Street and Square, Highland

Avenue, and Highland Street from Norfolk Street to near Marella Street.

The highest door-sill in the above-described district is that of Mr. Hunnewell's house on Beech Glen Avenue, which is about 149 feet above "tide marsh level."

The second district has an area of about thirty acres, and includes within its limits Regent Street, Alpine Street, Akron Street, Fountain Street, Summit Street, Buena Vista Avenue, portions of St. James and Circuit Streets, and sundry small courts and places. The highest door-sill in this district is that of D. M. Nichols, on Alpine Street, which is 117.80 feet above "tide marsh level."

The third district has an area of about one hundred acres, and comprises the bulk of the territory South of Tremont Street, West of the Providence Railroad, and North and East of Heath Street.

The highest door-sill in this district is that of the house of Nathan Brown, on the summit of Parker Hill, which is 224.60 feet above "tide marsh level."

The fourth has an area of about three hundred and ninety acres, and includes nearly all the territory bounded by Shawmut Avenue, Munroe Street (including the same), Warren Street, Grove Hall Avenue, and Seaver Street, which last forms the boundary line between Boston and West Roxbury.

The highest door-sill in this district is that of the house of Mr. Charles Davenport, on Maple Street, which is 174.20 feet above "tide marsh level."

Although the boundaries of these districts include some houses which can be reached by our present service, yet they are not thoroughly served, and the lines, as drawn, avoid, as much as possible, a duplication of pipes, and the consequent expense.

It having been decided by your Board that it was both expedient and necessary to furnish an adequate supply for these high sections, — a portion at once, and the whole before many years

—and as pumping works were, of course, decided to be essential, the only questions to be decided were, first, whether we should have a reservoir or use a stand-pipe, and then the location of whichever should be decided upon; the question of the location of the pumping-engine not being very material.

It was found that the only location where a reservoir could be built, and be at a sufficiently high level, was upon the very summit of Parker Hill. This was deemed too much upon the outskirts of the districts, and the probability, not to say necessity, of reducing the height of the hill to render it accessible and convenient for dwelling purposes, seemed to settle the question of a reservoir, unless the stand-pipe system should be found to be inefficient or undesirable.

A visit to Philadelphia, and the examinations and inquiries there made, satisfied a committee of your board, and myself, that the stand-pipe system would be both efficient and economical, and it was thereupon decided to adopt it. The lot known as the "Old Fort lot," which had already been purchased by the city as a probable site for a reservoir, was deemed the most central and eligible location for the stand-pipe, and was accordingly adopted. This lot is located between Beach Glen Avenue on the south, and Fort Avenue on the north; the highest point of the natural ground, which is mostly rock, of the formation known as "Pudding stone," is about one hundred and fifty-seven feet above "tide marsh level"; the highest point of the earthwork of the old fort is one hundred and sixty-three feet above the same datum.

The location of the engine-house and pumps was, after considerable investigation and an examination of several localities, finally fixed on the rear portion of the new Station-house lot on Pyncheon Street, between Washington and Tremont Streets, a small parcel having been purchased and added to the rear of the Station lot so as to give a frontage on Elmwood Street of about forty feet.

The portion transferred from the Station-house lot was 3,431 square feet, and the additional parcel purchased of Nancy Shove contained 2,132 square feet, making 5,563 square feet in all, an area amply sufficient for the engine-house, boiler-house and coal shed.

Several designs for a stand-pipe were made and presented to the Board, and estimates were procured on each. The one finally adopted was a single tube or cylinder, five feet in diameter, to be made of boiler plate, and to be in height about eighty feet above the ground. This pipe is to be enclosed in a brick tower resting upon a quadrangular buttressed base. Between the pipe and the interior wall of the tower is a space of about three feet, in which is a spiral staircase leading to a lookout at the top.

The proposed grade of the ground at the base of the tower will be one hundred and fifty-eight feet above "tide marsh level," and the floor of the lookout, which is about three feet below the top of the stand-pipe, will be two hundred and thirty-five feet above the said datum line.

Contracts have been made for the iron work, and also for the masonry. The iron work is to be furnished and erected by the Boston Machine Company, and the masonry by Messrs. Standish & Woodbury. The soil has already been stripped from the rock foundation, and everything will soon be in readiness for the contractors, whose work, by agreement, is to be finished by the first day of October.

The pumping-engines finally adopted for this work are from designs furnished by the Boston Machine Company. It was the original intention to use the "Worthington Duplex Engine," which has so justly earned for itself a reputation ranking among the very best of those now in use in this country, and a very decided indisposition existed, in my own mind — and I think I may say in that of the Committee in charge — to the trial of experiments in a matter of so much importance. The request,

however, of the Boston Machine Company to be allowed to furnish and submit designs at their own expense was granted, and they were invited to submit a proposal for furnishing and erecting the engines. H. R. Worthington & Co. were also invited to submit proposals for furnishing and erecting their engines; the engines in both cases to be of the capacity prescribed in the instructions furnished each party. The proposal of the Boston Machine Company, being some ten thousand dollars lower than that of Worthington & Co., would probably have been at once accepted, but for the indisposition above alluded to in regard to experimenting. The propositions, therefore, were held in abeyance until the designs furnished could be thoroughly examined, and their merits or demerits determined. After a thorough examination by myself and the committee, and a casual examination by Mr. Chesbrough, the City Engineer of Chicago, which failed to detect any faults, it was decided to follow the advice of Mr. Chesbrough, and refer the plans to a competent practical mechanical engineer.

Mr. Albert Betteley having been selected as a competent judge in such matters, the plans were submitted to him with a memorandum of the required duty, etc., and his report submitted March 26, 1869, being favorable in all respects, the contract was awarded to the Boston Machine Company, who are to furnish and erect the engines in good running order, on or before the first day of October, 1869, and also guarantee the performance of the required duty, for the sum of Thirty-seven Thousand Dollars.

Plans are now being prepared for the engine-house and appurtenances, and it is expected to be ready to receive the engines as soon as they are in condition to be erected.

The plan for receiving the water at the pumps and its conveyance thence to the stand-pipe and the several districts to be supplied may be thus briefly described:—A sixteen-inch pipe leads from the twenty-four inch main, near its junction with the

thirty-six, and passes through the station-house yard, under the coal-shed and boiler-house to the engines, the distance being about 225 feet. A three-way branch and two sixteen-inch gates regulates the flow so that either or both engines may be supplied at will.

A sixteen-inch pipe leads from each engine, and, by means of a Y branch, connects with the single force-main which leads to the stand-pipe, just outside the engine house. Each of these pipes between the engine and the Y is provided with a check-valve to prevent the backward flow of the water into the engine house in case of a breakage of the pumps. The single force-main, sixteen inches in diameter passes from the Y through Elmwood Street, across Washington Street, passing under the twenty-four and twelve-inch pipes, through Gardner and Centre Streets, and Fort Avenue to the lot where the stand-pipe is located; and thence to the stand-pipe itself. The length of this main is about 2,500 feet and is provided at two points with check-valves. The arrangement of branches and gates in the vicinity of the stand-pipe is such that, in case of any accident to the stand-pipe requiring repairs, it may be disused and the engines pump directly into the distribution pipes of either or all the districts.

The general plan of distribution may be briefly described as follows, viz: A sixteen-inch main leads from the stand-pipe, in a southerly direction, to Beech Glen Avenue; thence through said avenue to Highland Street; thence across Highland Street to Ellis Street; thence through Ellis, Thornton and Oakland Streets to Shawmut Avenue; thence across Shawmut Avenue to Dale Street, and thence through Dale Street, across Walnut Avenue to Warren Street.

From this main a twelve-inch branch is taken at Beech Glen Avenue, one at Walnut Avenue, and one at Warren Street; while at Highland Street, a six-inch branch is taken, and also one at Walnut Avenue. The twelve-inch branch at Beech Glen

Avenue, leads in a westerly direction, through said avenue to Fort Avenue; thence through Fort Avenue to Centre Street; thence through Centre Street to New Heath Street; thence through New Heath Street to Parker Street, and thence through Parker Street to Parker Hill.

The twelve-inch branch at Walnut Avenue leads southerly through Walnut Avenue, and the one at Warren Street leads southerly through Warren Street; the lateral streets between said Walnut Avenue and Warren Street, and on either side of the same, to be supplied with six-inch pipes. These last mentioned twelve-inch pipes supply what is before described as the "Seaver Hill District." The six-inch branch at Highland Street connects with the six-inch pipe already laid, and is to supply the "Highland Street" or "Fort District." The six-inch branch at Walnut Avenue, leads northwardly through Walnut Avenue to Buena Vista Avenue and Circuit Street, and supplies the "Tommy's Rocks District."

It is not proposed to do anything this season in laying the mains on the routes above described; but, as a temporary measure for supplying the "Highland Street" and "Tommy's Rocks Districts," a return sixteen-inch pipe will lead from the stand-pipe back to Fort Avenue, there connecting with a twelve-inch pipe which leads through said avenue to Highland Street, and there connects with the present six-inch pipe.

A temporary connection between this district and the "Tommy's Rocks District" will be made in Circuit Street either from the six-inch pipe to be laid in Guild Street, or the one in Cedar Street.

#### WESTERN DIVISION.

The report of the Superintendent of the Western Division will furnish all the required information as to the condition of the grounds and property at the lake and at Brookline reservoir.

During the past year considerable progress was made in the work of marking the bounds of the city's property around the lake and along the line of the conduit, by means of permanent stone posts. This is an important work, and should be finished this year.

The annual examination of the interior of the conduit was made last month throughout its whole length. The portion between the lake and Charles River was examined by myself, accompanied by Mr. Wiggin, the Clerk at Chestnut Hill reservoir, and two laborers. The lower sections from Charles River to Brookline reservoir, was examined by Mr. Wightman, the Resident Engineer at Chestnut Hill Reservoir, and Mr. Stanwood, the Superintendent, accompanied, for a portion of the way, by a corps of distinguished assistants, representing your Honorable Board and the two branches of the City Council.

The general condition of the conduit between the lake and Charles River is very much the same as at the last examination a year ago. The dirt and slime in the section near the lake should be removed at once, and those fissures which are alluded to in the notes of examination below, should be plugged up.

The following is a transcript of the notes of the examination :

#### FIRST DIVISION.

April 23, 1869. Entered conduit at Lake at 8.55 A. M.

The conduit is very dirty from about Station 3 to Station 9.

Between Stations 17 and 18 is a fissure in the bottom bringing in water and sand.

Between Stations 20 and 21 are several places where the cement used in repointing has fallen out.

Between Stations 56 and 57 a small place where the cement has dropped out and the bricks have settled a little.

At Station 60 the figure 6 is wrong side up, reading 90 instead of 60.

Near Station 73 is a place about two feet square where the



joints need repointing. A little below, on the left, quite a stream coming in.

Between Stations 74 and 75 another stream; also considerable sand along the bottom.

At  $97\frac{1}{2}$  another stream with sand.

At about Station 100 is still another stream. The bottom is very sandy.

Reached Station 106, 40 feet over two miles, in just an hour and a half.

Man hole at Station 115 leaks badly.

From Station 141 to  $142\frac{1}{2}$  are several small cracks in top arch.

Between Stations 151 and 152, fine crack in top.

Between Stations 154 and 155 is a crack in top all the way, open a quarter of an inch.

Reached Dedman's Brook, waste weir, Station 155, at 11 o'clock.

Re-entered conduit at 11.45 o'clock.

Between Stations  $168\frac{1}{2}$  and 170 is crack in top. Cement fallen out. Should be repointed.

Several places that have been repointed show no signs of weakness.

Between Stations  $178\frac{1}{2}$  and 180 there is a crack a little below the top on the right, in some places very fine, but in no place over an eighth of an inch. This crack continues at intervals to about Station 184.

The conduit this side the water weir is very clean.

Between Stations 207 and 208 is a fine crack in top the whole distance.

From Station 245 to a little beyond 246 is a fine crack alongside of an old repaired one.

Between Stations 247 and 248 is a short crack, worse than any seen yet; appears again at intervals a little beyond 248.

At Station 255 is an old crack that has been repointed, and the cement remains perfectly sound and unbroken.

From Station 272 to 272½ is an old crack in top, which has been bridged at intervals with Portland cement, to determine if the crack increased. The cement bars or bridges have not broken in a single instance.

At this place there is a corresponding crack in the bottom arch. These cracks should be pointed up.

The figures at Station 282 are wrong, there should be a 2 in place of the 9.

At half past one o'clock reached end of First Division, which is Station 298.

#### SECOND DIVISION.

Between Stations 15 and 17 an old crack has been patched, as above described, to test it, but it has not opened any more.

From the last mentioned point to the West Pipe Chamber — Station 112 — the conduit is in very good condition. The repairs at "Ware's Valley" stand remarkably well.

Reached the West Pipe Chamber, at Charles River, at 2.50 o'clock.

The following memoranda of the condition of the Conduit between Charles River and the Waste Weir at Newton Centre is furnished by Mr. Wightman:—

Between Stations 196 and 197 is a small crack in top arch.

At Station 206, small crack in bottom arch which lets in some sand.

Between Stations 217½ and 218½ crack in bottom and top arches and some sand in bottom of Conduit. This crack should be pointed.

Between 224 and 225 double crack in top arch, and also crack in bottom arch.

Between 232½ and 234 small crack in bottom and top arches.

Between 242 and 244½ is a bad crack in bottom and top arches, with considerable sand in bottom of Conduit. This crack should be attended to.

Between 254 and 255 small crack in top arch.

Between 263½ and 264 small crack in top arch.

### THIRD DIVISION.

Between Stations 1 and 2 small crack in top arch.

The Conduit is in good condition as to cleanliness, and the cracks enumerated above are in about the same condition they were in 1867, as well as I could judge.

The following is Mr. Stanwood's memoranda of the condition of the remaining section of the Conduit, from the Waste Weir at Newton Centre to Brookline Reservoir:—

That portion of the Conduit that was examined by me April 23, was found in good condition with but few exceptions. Between Brookline and Chestnut Hill Reservoirs,—between Stations 156 and 157, for about 20 feet, a slight crack is shown on the top; this occurs at the point where the sewer was carried under the Conduit. Between the Intermediate and Influent Gate Houses (or what is better known as the "Bennett Field"), the old cracks have enlarged a little and need repairs, which can be done as soon as the Lawrence Meadow basin is filled. Between the "Bennett Field" and the Newton Centre Waste Weir the Conduit is in good condition. The tunnel section should be cleaned out as soon as the Conduit can be spared for that purpose.

### WATER AT THE LAKE.

The water in the lake, on the first of January, 1868, stood at 10 feet 5½ inches above the bottom of the conduit; on the eighth of January it had risen to 10 feet 7 inches, and then gradually fell off to 10 feet 1 inch on the twenty-first, at which level it stood until the thirty-first. On the eighth of March it had fallen to 9 feet 3 inches, which was the lowest point reached during the year. It then began to rise, and on the fifth of April was at high water mark, or 13 feet 4 inches above the bottom of the

conduit, and still continued to rise until the eleventh, when it had reached 13 feet 9 inches and was running to waste seventeen inches deep over the outlet dam. On the twenty-eighth of April it had fallen to 12 feet  $11\frac{1}{2}$  inches, and the waste had stopped. It then began to rise again, and on the eighth of May was 13 feet  $8\frac{1}{2}$  inches, and stood at that height for three days, with six inches of water running to waste. On the eighteenth it had risen still higher, to 13 feet  $11\frac{1}{2}$  inches, when the waste was increased to 17 inches, which brought the water down to 13 feet  $8\frac{1}{2}$  inches again on the twentieth. Another rise then commenced and by the twenty-fourth it had reached the highest point of the year, 14 feet above the bottom of the conduit, and at this time 24 inches in depth was running over the outlet dam, wasting the water at the rate of 140,000,000 gallons per day. In a week the water was reduced 13 feet 4 inches, when still another rise occurred, and on the twelfth of June it was up to 13 feet  $9\frac{1}{2}$  inches, with 12 inches running to waste at the outlet. June twenty-first it was 13 feet  $3\frac{1}{2}$  inches and remained about so until the twenty-fifth when it began to fall, and on the ninth of August was at 11 feet 10 inches and remained so until the fifteenth, when a further decline commenced and continued until the fourth of September, reducing the water to 11 feet  $5\frac{1}{2}$  inches. It then rose to 11 feet  $8\frac{1}{2}$  inches on the fourteenth, and fell off again to 11 feet  $5\frac{1}{2}$  inches on the twenty-third. In a week it had gained 7 inches and remained stationary until October eleventh, between which time and the first of November it fell off 8 inches, to 11 feet 4 inches. November thirtieth it had risen to 12 feet 4 inches, at which height it remained until December seventh. On the thirtieth it had risen to 12 feet 7 inches, and then declined gradually to 12 feet on the thirty-first of December.

On page 41 will be found the usual table of the heights of water at the lake above the bottom of the conduit averaged for each month and for the year, from 1851 to 1868 inclusive. It

will be seen that the average for 1868 is among the highest for the period of eighteen years, being 11.92 feet, while that of last year was 12.33, and the highest of all, in 1863, was 13.52. The table on page 44 shows the varying depths of the water as run into the conduit at the lake, the number of days in each month that the water was run at those depths, and also the average depths for each month and for the whole year. It will be seen that the conduit has been empty (water shut off), four days during the year; that it has been run full and more than full (6 feet 4 inches to 7 feet), for seventy-two days, and that the average for the whole year was 5 feet 8 inches.

On page 38 will be found a statement of the annual rainfall at the lake; the amount which fell on the water-shed, in gallons, the amounts consumed and wasted, the total amounts and the daily average amounts received into the lake, and the available per centage of rainfall collected from 1852, to 1868, inclusive.

From this table it appears that although the rainfall of the past year was six inches less than in the previous year, yet, the per centage received into the lake was fifteen per cent greater. The average daily capacity of the lake as a source of supply for the last year was 22,567,160 gallons, and deducting the average daily waste, which was 6,851,600 gallons, we find the net capacity was 15,715,560 gallons. If we take the whole period of fifteen years it will be found that the net capacity was 17,628,440 gallons per day.

The following statement shows the months in which the water was wasted at the lake, the number of days in each month and the amount:

April, 20 days . . . .	767,138,993 gallons.
May, 24 " . . . .	1,555,152,329 "
June, 6 " . . . .	185,393,062 "
<u>          </u>	<u>                          </u>
Total, 50 days . . . .	2,507,684,384 "
Daily average for whole year . .	6,851,600 "

## CONSUMPTION OF WATER.

The usual statement of the daily average amount of water consumed for each month and year since 1849, may be found on pages 39-40. The amount for the past year was 14,769,167 gallons per day, an excess over last year of 1,204,167 gallons per day.

The highest average for any one month was 16,927,000 gallons in February, and the lowest was 12,636,000 gallons in April.

## RAINFALL.

On page 43 will be found the usual tables of the rainfall at Lake Cochituate, Boston, Cambridge, Lowell, Waltham and Providence, from 1849 to 1868 inclusive. There will also be found on page 42 a table showing the days in each month on which rain or snow fell, and the several amounts. To the several gentlemen who have furnished the material for the aforesaid tables, I desire to express my best thanks.

## CHESTNUT HILL RESERVOIR.

The following statement in regard to the progress of the work at this locality during the past year has been furnished me by the resident engineer, Henry M. Wightman, Esq. As it is quite a full and detailed report, I have thought it best to incorporate it entire, as being substantially what I should have written myself, though perhaps more in detail.

## "REPORT ON CHESTNUT HILL RESERVOIR.

"The work on this reservoir has steadily progressed since the date of the last annual report, and every exertion has been made to complete it in the shortest possible time.

"The following is a table showing the average number of men employed since the commencement of the work.

	Men.	Teams.		Men.	Teams.
1866, April . . . . .	182	9	" November . . .	522	65
" May . . . . .	327	18½	" December . . .	413	65
" June . . . . .	385	23	1868, January . . .	355	65½
" July . . . . .	400	27	" February . . . .	357	66
" August . . . . .	424	32½	" March . . . . .	346	66
" September . . .	396	39½	" April . . . . .	373	66
" October . . . . .	386	40	" May . . . . .	477	69
" November . . .	319	40	" June . . . . .	602	77
" December . . .	270	40	" July . . . . .	580	85
1867, January . . .	257	40	" August . . . . .	536	87
" February . . . .	240	40	" September . . .	527	88
" March . . . . .	222	40	" October . . . . .	536	88
" April . . . . .	373	45½	" November . . .	500	84
" May . . . . .	406	49	" December . . .	527	75
" June . . . . .	611	49	1869, January . . .	621	75½
" July . . . . .	734	59	" February . . . .	705	75½
" August . . . . .	755	59	" March . . . . .	558	76
" September . . .	652	64½	" April . . . . .	531	76
" October . . . . .	594	65			

"This table shows the varying character of the work by the increase and decrease of the men and teams.

"The principal portion of last season's work was on the Lawrence Meadow section of the reservoir, as it was deemed of importance to complete that basin in order to fill it and have it ready for use by the spring of 1869. Every available team and man that could be spared from work which it was not absolutely necessary to complete on the lower basin, was employed on this section, and it was completed at the time appointed and ready for the reception of the water, October 26, 1868.

"The work done on the lower basin was the excavation of about 35,000 cubic yards of quicksand for the foundation of the effluent gate-house, and the water bank at this place, and the

building of about 1000 lineal feet of bank on the northerly side of the basin.

“The building of the bank was continued until cold weather, when the grading of the driveway was commenced, and is now completed, with the exception of a small section at the easterly end.

“The work during the winter has been stripping the soil in the lower basin, loaming the banks and ballasting the walks around it, excavation and back-filling on the pipe-route, and excavation of puddle trench.

“On the eleventh of January work was commenced on the pipe route for laying the 48-inch main from this reservoir to the pipes from the Brookline Reservoir, on Boylston Street, near the Goddard Estate. The weather being very favorable it was continued, with but slight interruption, until April first, and 6,608 feet of trench have been dug, and 6,350 feet of pipe laid and back-filled up to the present time. The balance of the trench will be excavated, and the pipe laid, when the culvert at the brook near Beacon Street is completed, and the Superintendent of the Eastern Division can spare his men to make the connection with the three lines of pipe from Brookline reservoir.

“About one-third of the foundation of the effluent gate-house was built last fall, from September to December, and work was commenced upon it again about the first of May, and is now rapidly progressing. It was ascertained in excavating for the foundation of this structure that it would be necessary to take out twenty-eight feet in depth of quicksand, in addition to the depth already excavated, if the wing walls upon the water front were carried to a gravel or rock stratum. This expense was not deemed advisable and a pile foundation has been put in for them. A row of close piling has also been driven the entire length of the bank, where this quicksand will underlie it, to keep the weight of the bank, when built, from pressing it out from beneath it. The foundation for this gate-house has been



a much more expensive work than was anticipated, not only on account of the greater depth of quicksand than was shown by the soundings, but also from the difficulty of keeping the pit free from water during the progress of the work. During the severe rain-storm of the fifteenth of February the water accumulated with such rapidity that the brook did not carry it away fast enough to prevent its breaking through the dam which surrounded the excavations for this foundation. The flume which conveyed the water across the pit, and into which the water was pumped from it, broke, and notwithstanding the most strenuous exertions to prevent it the pit was soon completely full, burying the engine and pump in water. Steam fire engines and a Gwynn pump were obtained from Boston, and it then took a week to lower the water so that the engine and pump located there could resume their work.

“In November, 1868, it was ascertained that the new piece of conduit was cracked, and the bank seemed weak at the dam between the upper and lower basins. A plan was submitted to your Board for strengthening the dam by means of a puddle trench, and by widening the bank to 80 feet, instead of keeping it 60 feet in width, as was originally intended. This plan was adopted and the work of excavating for the puddle trench commenced the sixteenth of November, 1868. This trench is 10 feet in width, and was carried to a depth of 15 to 17 feet to rock bottom. In the centre of this trench, and upon the rock, was laid a tooth wall of brick, 18 inches thick and 18 inches high, the whole length of the trench, 400 feet, and the trench was then filled with clay puddle. This puddle trench will prove an effectual barrier to the passage of any water through the bank, and by the widening of the bank a driveway can be obtained to the front of the intermediate gate-house.

“The cut granite for the effluent gate-house is nearly all delivered, and the building of it will be commenced as soon as the foundation is in.

“The embankment at this place is very heavy, in length about 1,100 feet, and varying in height from 20 to 40 feet.

“The following statement shows the amount expended from the appropriation for Chestnut Hill reservoir for engineering during the year ending April 30, 1869, viz :

Salary of Henry M. Wightman, Resident Engineer	\$2,276 00
“ W. H. Learned, Assistant Engineer . .	799 00
“ Wm. Jackson, Leveler and Draughtsman	383 50
“ Daniel C. Sanger, Rodman . . .	321 50
“ James A. Hildreth, “ . . .	47 00
“ J. Sullivan, Axeman . . . .	584 00
“ E. R. Brown, Architect . . . .	786 00
“ John Day . . . . .	43 75
Total . . . . .	<u>\$5,241 25 ”</u>

# REPORT OF THE WATER BOARD.

45

*Statement showing Amount of Rainfall on Water-shed of Lake Cochituate, Amount of Water consumed, and wasted, available Amount received into Lake, available percentage of Rainfall, etc., from 1852 to 1868, inclusive. Water-shed of Lake = 12,077 acres.*

YEAR.	Rainfall.	Amount of Rain-fall on Water-shed of Lake Cochituate.	Amount of Water consumed.	Amount of Water wasted from Lake.	Total amount consumed and wasted.	Rise of Lake during the year.	Fall of Lake during the year.	Total available amount of Rain-fall received into Lake.	Available daily average am't of Rainfall rec'd into Lake.	Available per-centage of Rain-fall rec'd into Lake.	
	Inches.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.		
1852*	47.43	15,759,207,000	2,947,042,800	4,020,566,885	6,994,609,685	.....	261,360,000	6,733,249,685	18,396,857	43 per cent.	
1853	55.86	18,366,561,000	3,117,939,500	3,166,417,500	6,284,357,000	239,580,000	.....	6,523,937,000	17,873,800	35 per cent.	
1854	43.15	14,187,562,000	3,614,230,000	4,187,733,020	7,801,963,020	.....	217,800,000	7,584,163,020	20,778,529	53 per cent.	
1855	34.96	11,494,719,000	3,776,399,500	No acct kept.	.....	.....	326,700,000	.....	.....	.....	
1856	40.80	13,414,892,000	4,409,787,600	No acct kept.	.....	598,950,000	.....	.....	.....	.....	
1857	63.10	20,747,652,000	4,644,990,000	10,625,900,000	15,270,890,000	32,670,000	.....	15,303,560,000	41,957,562	74 per cent.	
1858	48.66	15,999,232,000	4,689,155,000	1,634,500,000	6,623,655,000	.....	141,570,000	6,482,085,000	17,759,013	40 per cent.	
1859†	49.02	16,117,602,000	4,808,875,000	7,569,000,000	12,377,875,000	283,140,000	.....	12,661,015,000	34,687,712	78 per cent.	
1860	55.44	18,228,471,000	6,309,108,000	None.	6,309,108,000	174,240,000	.....	6,483,348,000	17,714,065	35 per cent.	
1861	46.44	15,269,303,000	6,639,095,900	3,377,558,966	10,016,654,866	.....	1,459,260,000	8,557,394,866	23,444,917	56 per cent.	
1862	49.69	16,337,890,000	6,069,000,000	33,200,000	6,092,200,000	1,306,800,000	.....	7,399,000,000	20,271,233	45 per cent.	
1863	69.30	22,785,586,000	5,927,052,500	2,165,996,470	8,092,748,970	762,300,000	.....	8,855,048,970	24,280,408	39 per cent.	
1864	42.60	14,006,726,000	6,105,306,700	1,368,746,000	7,474,052,700	.....	1,848,577,000	5,625,475,700	15,370,152	40 per cent.	
1865	49.46	16,262,266,000	4,621,630,000	1,688,120,674	6,309,750,674	743,242,500	.....	7,052,973,174	19,323,270	43 per cent.	
1866	62.32	20,490,455,000	4,463,585,000	None.	4,463,585,000	743,242,500	.....	5,206,327,500	14,235,280	25 per cent.	
1867	56.25	18,494,795,000	4,294,176,000	2,482,041,000	7,254,570,000	.....	698,811,000	6,555,759,000	17,961,000	35 per cent.	
1868	50.06	10,459,544,000	5,405,515,000	2,507,684,000	7,913,199,000	346,371,000	.....	8,259,570,000	22,567,160	50 per cent.	
Average, 50.88		Aver. daily waste for 15 years . . . . .	8,241,140			Average daily capacity of Lake as a source of supply for 15 years, 21,773,400					46 p. ct. av.
		“ “ “ for 6 years, '52-'59 . . . . .	14,378,900			• Observations of Rainfall at Lake Cochituate commenced 1852, and these observations are assumed as correct					
		“ “ “ last 9 years, '60-'68 . . . . .	4,144,960			† Lake raised two feet, for the whole district.					

*Consumption of Water. Daily Average Number of Wine Gallons drawn from the Brookline Reservoir.*

MONTH.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.
January . . . . .	1,700,000	5,181,700	7,233,700	8,230,900	8,050,500	10,695,200	9,702,700	12,069,000	15,089,000	12,160,000
February . . . . .	. . . . .	5,214,000	7,221,100	8,790,300	8,643,600	10,654,200	10,349,800	12,791,000	14,175,000	14,399,000
March . . . . .	1,550,000	4,841,200	6,137,900	8,521,100	8,202,200	9,582,100	10,125,600	12,504,000	13,941,000	14,154,000
April . . . . .	. . . . .	4,961,000	5,365,200	8,048,700	7,903,600	8,738,500	8,540,000	10,800,000	12,454,000	13,465,000
May . . . . .	3,600,000	5,346,100	6,238,400	8,350,000	8,123,400	9,685,300	9,103,800	10,375,000	12,414,000	11,423,000
June . . . . .	4,300,000	6,906,500	7,925,000	8,033,100	8,945,900	11,745,200	9,984,400	11,223,000	12,504,000	10,867,000
July . . . . .	4,800,000	8,514,200	7,180,200	9,608,000	8,809,200	10,613,800	11,056,600	13,167,000	13,551,000	13,621,000
August . . . . .	4,100,000	8,004,000	7,235,000	9,709,300	8,461,900	10,028,100	11,120,800	12,064,000	13,077,000	13,141,000
September . . . . .	4,800,000	6,585,500	7,230,600	7,920,000	8,640,700	9,712,400	11,710,800	11,522,000	12,030,000	12,745,000
October . . . . .	4,550,000	4,504,300	6,716,600	6,430,000	8,871,100	8,769,800	10,771,200	11,891,000	10,864,000	12,969,000
November . . . . .	3,800,000	4,960,500	6,473,500	6,637,900	8,624,700	8,030,200	10,383,200	11,691,000	11,372,000	12,143,030
December . . . . .	3,600,000	5,037,000	7,663,400	7,195,800	9,228,400	10,597,600	11,307,200	13,284,000	11,241,000	13,075,000
Average for Year . .	3,680,000	5,837,900	6,883,800	8,125,800	8,542,300	9,902,000	10,346,300	12,048,600	12,726,000	12,847,000

*Consumption of water. — Continued.*

MONTH.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.
January . . . . .	14,512,000	17,862,000	21,106,769	17,000,000	16,112,000	18,954,000	13,412,000	14,850,000	13,511,000	15,992,000
February . . . . .	14,769,000	18,401,000	20,804,131	17,000,000	17,828,000	18,846,000	13,318,000	13,385,000	13,831,000	16,927,000
March . . . . .	14,480,000	15,409,000	19,453,344	17,300,000	16,681,000	16,841,000	12,027,000	12,284,000	13,100,000	13,722,000
April . . . . .	13,760,000	14,621,000	17,151,593	15,300,000	15,125,000	16,806,000	11,975,000	11,251,000	12,770,000	12,636,000
May . . . . .	11,302,000*	14,790,000	16,687,832	14,300,000	15,407,000	16,094,000	13,660,000	11,076,000	12,301,000	13,846,000
June . . . . .	11,639,000	17,838,000	17,231,984	16,600,000	16,138,000	17,730,000	14,391,000	11,878,000	13,625,000	14,351,000
July . . . . .	13,219,000	17,239,000	18,897,809	16,400,000	15,954,000	18,112,000	13,207,000	12,668,000	14,250,000	14,676,000
August . . . . .	12,704,000	19,297,000	18,272,365	17,000,000	16,980,000	16,188,000	13,426,000	12,441,000	14,546,000	14,479,000
September . . . . .	12,389,000	17,957,000	18,098,259	17,000,000	17,035,000	16,798,000	12,624,000	11,842,000	13,186,000	16,072,000
October . . . . .	12,026,000	16,938,000	17,987,128	17,300,000	15,779,000	15,479,000	11,273,000	12,396,000	13,518,000	14,954,000
November . . . . .	12,715,000	16,862,000	16,604,076	17,100,000	16,038,000	14,079,000	11,750,000	11,262,000	12,707,000	13,975,000
December . . . . .	14,586,000	19,151,000	15,976,362	17,000,000	16,295,000	14,547,000	10,877,000	11,412,000	15,434,000	15,660,000
Average for Year . .	13,175,000	17,238,000	18,189,304	16,600,000	16,238,500	16,681,000	12,662,000	12,229,000	13,565,000	14,769,167

Table of the average monthly and yearly heights of water in the Lake above the bottom of the Aqueduct.

MONTH.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.*	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.
January . .	9.50	10.63	9.51	10.54	10.16	8.06	9.53	10.75	10.80	10.83	11.93	6.09	11.33	13.88	7.41	8.37	12.14	10.29
February . .	10.21	10.20	10.78	10.95	10.65	7.59	10.28	10.05	12.17	11.36	12.77	6.57	12.85	13.71	8.24	8.73	13.14	9.75
March . . .	10.43	10.49	10.44	10.93	10.68	6.96	10.67	9.35	12.45	12.67	13.21	8.65	13.95	14.33	12.28	10.58	13.57	10.96
April . . . .	11.17	11.23	10.68	10.66	11.57	10.24	12.30	9.36	12.06	12.72	14.14	12.40	14.59	14.32	14.00	11.96	13.50	13.29
May . . . . .	11.02	10.94	10.98	10.87	11.35	12.05	12.05	10.67	12.06	11.52	13.88	14.45	14.01	14.26	14.00	12.01	13.44	13.67
June . . . . .	10.40	10.28	10.62	10.33	10.69	11.78	12.14	11.72	11.96	10.83	12.99	14.43	13.29	13.51	13.41	12.72	13.20	13.37
July . . . . .	9.76	9.44	9.45	9.00	9.86	10.67	11.41	11.74	10.22	10.42	11.50	14.05	12.82	11.33	12.28	11.84	12.12	12.46
August . . . .	9.01	8.40	8.64	6.67	9.61	11.59	11.70	11.30	10.24	9.42	10.27	12.97	13.73	9.65	11.18	11.79	12.17	11.70
September . .	8.00	5.68	7.78	6.64	7.52	10.82	11.72	10.40	9.84	9.42	8.71	11.33	13.43	7.91	10.09	11.59	12.00	11.61
October . . . .	7.55	6.55	7.34	5.90	6.42	10.10	11.10	8.72	10.15	10.35	7.79	10.30	12.94	6.46	9.02	11.72	11.10	11.83
November . .	8.07	7.74	9.58	6.09	6.28	10.80	11.16	9.01	9.98	10.44	7.22	10.24	13.26	5.48	8.74	11.41	11.03	11.75
December . .	9.67	8.49	10.57	8.38	7.29	10.97	11.02	9.85	10.54	11.17	6.88	11.70	14.06	5.41	8.48	11.68	10.51	12.33
Yearly av. . .	9.57	9.17	9.70	9.00	9.29	10.14	11.26	10.24	11.04	10.83	10.94	11.10	13.52	10.84	10.76	11.20	12.33	11.92

\* High water mark raised two feet.

*Table showing the Rainfall in Boston, for the year 1868, and the days on which it occurred, from observations by Wm. H. Bradley, Esq., Superintendent of Sewers.*

Day of Month.	MONTHS.											
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	INCHES.											
1. ....	..	..	..	..	..	..	..	..	..	..	1.04	..
2. ....	..	..	1.60	..	.72	..	..	.03	..	.16	.16	..
3. ....	..	..	..	..	..	..	..	..	..	..	..	..
4. ....	..	..	..	..	..	..	..	2.67	..	..	..	..
5. ....	.64	..	..	.48	..	..	..	.15	1.64	..	.12	.88
6. ....	..	1.12	..	..	..	..	..	.33	..	..	..	..
7. ....	..	..	..	..	..	.08	..	..	.54	..	..	..
8. ....	..	..	..	2.41	1.06	..	..	.42	.13	.05	.52	.92
9. ....	..	.44	..	..	..	..	..	.27	..	..	.08	..
10. ....	..	..	..	1.04	..	.01	..	..	..	..	.51	..
11. ....	..	..	..	..	..	..	..	.40	.40	..	.24	..
12. ....	..	..	.32	..	..	2.20	..	..	.39	..	..	..
13. ....	..	..	..	..	1.68	..	..	..	1.87	..	..	..
14. ....	..	..	..	.08	..	.08	..	..	..	.15	..	..
15. ....	.12	..	.28	..	.60	..	..	..	..	.19	..	..
16. ....	..	..	..	..	..	..	..	..	..	.48	..	..
17. ....	..	..	.36	.61	.82	..	..	..	..	..	..	..
18. ....	..	..	.32	..	..	..	1.06	..	..	..	1.68	..
19. ....	..	..	..	..	..	..	..	..	..	..	..	.32
20. ....	2.56	..	..	1.12	..	..	..	3.18	.40	..	..	..
21. ....	..	..	2.08	..	2.80	..	..	..	..	.40	..	..
22. ....	..	..	.08	..	..	1.42	..	..	..	.15	..	..
23. ....	.64	..	..	.20	..	..	..	..	.18	..	..	..
24. ....	..	..	..	..	1.56	..	..	..	..	..	..	..
25. ....	..	..	..	..	..	..	..	..	2.56	..	.08	..
26. ....	..	..	..	..	..	..	..	..	..	..	.88	..
27. ....	.45	.32	..	.68	..	..	..	..	3.84	..	..	.16
28. ....	..	..	..	..	..	..	..	..	..	.20	..	..
29. ....	1.68	..	..	.32	..	..	..	..	..	..	..	.04
30. ....	..	..	..	..	1.14	..	1.04	.08	..	..	..	..
31. ....	..	..	..	..	..	..	..	..	..	..	..	..
Totals . . . . .	6.09	1.88	8.04	6.94	10.38	3.79	1.10	7.53	11.95	1.78	5.31	2.32

Total for the year, 64.11 inches.

*Annual Amount of Rainfall, in Inches, at Lake Cochituate, Boston and vicinity, 1849 to 1868 inclusive.*

YEAR.	PLACES AND OBSERVERS.						
	Lake Cochituate, by Supt. of Western Division, B. W. W.	Boston, by J. P. Hall, to 1855; by W. H. Bradley, since 1855.	Cambridge, by the Director of the Observatory.	Waltham, by E. Hobbs and J. R. Scott, Agt. Boston Manufacturing Co.	Lowell, by Merrimac Manufacturing Co.	Lowell, by Locks and Canals Co., J. B. Francis.	Providence, by A. Caswell.
1849 . . . . .	. .	40.30	40.97	40.74	51.09	. .	34.69
1850 . . . . .	. .	53.98	54.07	62.13	45.68	. .	51.48
1851 . . . . .	. .	44.31	41.97	41.00	41.00	. .	43.30
1852 . . . . .	*45.93	47.94	40.51	42.24	42.78	. .	38.58
1853 . . . . .	*55.86	48.86	53.83	45.04	43.92	. .	53.27
1854 . . . . .	43.15	45.71	45.17	41.29	42.08	. .	46.25
1855 . . . . .	34.96	44.19	47.59	40.63	44.89	48.41	39.05
1856 . . . . .	40.80	52.16	53.79	42.33	42.49	45.97	40.97
1857 . . . . .	63.10	56.87	57.92	44.04	49.38	52.02	44.74
1858 . . . . .	48.66	52.67	45.46	37.40	37.73	35.80	44.51
1859 . . . . .	49.02	56.70	. .	48.49	47.51	48.41	45.29
1860 . . . . .	55.44	51.46	46.95	. .	46.91	46.67	38.24
1861 . . . . .	46.44	50.07	50.14	. .	43.32	42.95	44.25
1862 . . . . .	49.69	61.06	57.21	. .	44.26	44.61	50.09
1863 . . . . .	69.30	67.72	56.42	53.66	52.37	57.81	54.17
1864 . . . . .	42.60	49.30	. .	36.56	38.11	40.64	36.83
1865 . . . . .	49.46	47.83	43.59	35.84	37.38	38.82	44.69
1866 . . . . .	62.32	50.70	. .	43.46	38.18	41.36	46.04
1867 . . . . .	56.25	55.64	41.71	41.40	45.54	45.87	47.04
1868 . . . . .	50.06	64.11	39.89	44.65	47.96	49.58	53.52

\* By J. Vannevar.



## CONDUIT AT THE LAKE.

The following table shows the varying depths of the water in the Conduit at the Gate-House, the number of days in each month that the water was running at those depths, and the average depth for each month.

Depths. Ft. In.	Jan. Days.	Feb. Days.	Mar. Days.	Apr. Days.	May. Days.	June. Days.	July. Days.	Aug. Days.	Sept. Days.	Oct. Days.	Nov. Days.	Dec. Days.	Total Days.
0-0	..	..	..	1	..	..	..	..	2	1	..	..	4
4-6	..	..	..	1	1	..	..	..	..	..	..	..	2
4-8	..	..	..	21	3	..	..	..	..	..	..	..	24
4-10	..	..	15	7	15	..	..	..	..	..	..	..	37
5-0	..	..	6	..	2	6	..	..	..	..	12	..	26
5-2	..	..	..	..	..	..	..	..	..	..	1	1	2
5-3	..	..	..	..	..	..	..	..	1	15	..	..	15
5-4	..	..	..	..	..	..	..	..	..	..	..	10	10
5-6	2	..	..	..	..	..	15	3	..	..	..	1	21
5-8	16	4	2	..	..	19	13	25	12	2	5	..	98
5-10	1	1	..	..	..	..	..	3	2	..	..	..	7
6-0	12	7	8	..	1	..	3	..	6	2	..	7	46
6-2	..	2	..	..	..	..	..	..	..	..	..	..	2
6-4	..	13	..	..	6	5	..	..	2	2	..	..	28
6-6	..	2	..	..	2	..	..	..	..	..	..	..	4
6-8	..	..	..	..	1	..	..	..	..	..	..	..	1
7-0	..	..	..	..	..	..	..	..	5	9	12	12	38

*Average Monthly Depths.*

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average for the Year.
5f.9	6f.2	5f.2 $\frac{3}{4}$	4f.8 $\frac{1}{2}$	5f.3 $\frac{3}{4}$	5f.7 $\frac{3}{8}$	5f.7	5f.8	6f.0 $\frac{1}{2}$	5f.11	5f.11	6f.1 $\frac{3}{8}$	5f. 8in.



*Average monthly and yearly heights, etc. — Continued.*

MONTH.	SOUTH BOSTON. Maximum high water line, 122.86.								EAST BOSTON. Maximum high water line, 107.60.							
	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.
January . . . . .	115.03	113.66	115.73	110.63	114.21	114.38	112.46	111.15	95.37	96.26	95.64	90.22	96.12	93.61	91.89	92.81
February . . . . .	115.07	114.08	115.54	110.94	113.42	114.44	111.36	111.15	93.05	94.94	93.86	92.98	97.00	96.61	92.06	92.10
March . . . . .	115.12	114.12	115.36	111.13	113.64	113.51	111.74	111.11	94.60	95.75	94.29	93.50	94.83	94.22	91.69	91.14
April . . . . .	115.32	114.93	114.73	112.07	114.82	114.99	111.88	111.55	98.07	96.71	95.65	96.16	96.52	96.47	90.91	
May . . . . .	113.83	115.74	112.71	111.64	115.44	114.90	111.63	111.61	97.85	96.99	93.07	97.68	96.04	95.85	89.63	
June . . . . .	112.58	114.22	111.39	109.06	114.91	114.32	111.19	112.15	96.22	95.99	91.10	94.22	93.91	93.71	91.82	
July . . . . .	110.91	114.23	109.75	108.57	114.36	113.96	111.53	111.53	95.00	96.13	90.43	92.34	96.82	95.35	94.60	
August . . . . .	112.92	114.03	109.80	109.53	113.80	114.07	111.90	111.53	97.34	93.96	91.23	92.84	95.78	93.85	94.16	
September . . . . .	112.96	114.04	109.64	110.21	113.69	113.41	111.70	111.44	95.76	95.57	91.96	95.00	94.52	Shut off for repairs.		
October . . . . .	114.68	114.24	109.90	112.49	112.89	112.74	111.29	111.44	95.56	91.80	95.02	97.55	93.38	96.85	96.85	
November . . . . .	114.14	115.94	111.25	112.49	112.74	112.63	111.26	111.44	96.40	93.57	93.86	98.14	92.23	93.47	93.47	
December . . . . .	113.79	116.35	109.90	113.89	113.78	112.62	111.08	111.11	97.37	95.77	89.79	97.27	94.34	92.29	92.57	
Yearly Average . . . . .	113.86	114.63	112.14	111.05	113.97	113.78	111.59	111.44	96.05	95.29	92.95	94.83	95.12	94.66	93.25	92.02

Respectfully submitted,

N. HENRY CRAFTS,  
City Engineer.

## WATER REGISTRAR'S REPORT.

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WATER REGISTRAR'S OFFICE,  
BOSTON, May 1, 1869.

NATHANIEL J. BRADLEE, Esq.,

*President of the Cochituate Water Board:*

SIR: The following report is made in compliance with the requirements of the ordinance regulating the Boston Water Works.

The total number of water takers now entered for the year 1869, is 29,738, being an increase since January 1, 1868, of 1,634.

During the year there have been 680 cases where the water has been turned off for non-payment of rates. Of this number 585 have been turned on, leaving a balance of 95 still remaining off.

The total amount of water rates received from December 31, 1867, to January 1, 1869, is . . . . \$553,744 88

Of the above there was received

for water used in previous years,

the sum of . . . . \$43,306 35

Leaving the receipts for water fur-

nished during the year 1868,

the sum of . . . . \$10,438 53 

---

*Amount carried forward* . . . . \$553,744 88

<i>Amount brought forward,</i>	\$553,744 88
In addition to the above there has been received for turning on water in cases where it had been turned off for non-payment of rates, the sum of . . .	1,170 00

Total	<u>\$554,914 88</u>
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The amount received for water rates from January 1, 1869, to May 1, 1869, is . . . . .	562,031 33
--	------------

Of this amount there was received for water used in previous years, the sum of . . . . .	\$45,901 98
--	-------------

Leaving the receipts for water assessed (for the year 1869) to May 1, 1869, the sum of . . .	416,129 35
--	------------

The amount received from January 1, 1869, to May 1, 1869, for turning on water in cases where it had been turned off for non-payment of rates, is . . .	624 00
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Total receipts from January 1, 1868, to May 1, 1869, is . . . . .	<u>\$1,117,570 21</u>
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The increased amount of income in 1868 over the previous year, is . . . . .	\$31,613 95
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The total amount of assessments now made for the present year is . . . . .	435,123 65
--	------------

The estimated amount of income from the sales of water during the year 1869, is . . .	600,000 00
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The expenditures of my office during the year 1868 have been . . . . .	<u>17,769 46</u>
--	------------------

The items of this expenditure are as follows, viz :

Paid Wm. F. Davis, Registrar . . .	\$2,500 00
Charles H. Little, clerk . . .	1,966 67
Charles L. Bancroft, clerk . . .	1,375 00
Stephen Badlam, " . . .	1,375 00
Edwin Jennings, " . . .	1,375 00
J. F. Mayo, services on meters . .	1,070 00
R. D. Child, Inspector . . .	930 00
C. M. Thompson, " . . .	930 00
T. L. Kelley, " . . .	930 00
Josiah Hayward, Jr. Inspector . .	930 00
T. H. Badlam, " . . .	702 00
O. A. Ramsdell, " . . .	540 00
Extra Inspectors . . .	2,440 00
J. L. Fairbanks, for stationery . .	248 46
A. Mudge & Son, for printing . . .	457 33
	<hr/>
	\$17,769 46
	<hr/> <hr/>

#### METERS.

The total number of meters now applied to the premises of water takers is 1,021. Of this number, 782 are  $\frac{5}{8}$ -inch, 211 1-inch, 24 2-inch, 3 3-inch, 1 4-inch size ; they are attached to a variety of establishments, embracing hotels, railroads, manufactories, stables, confectionery, oyster saloons, and buildings occupied by several tenants.

The following table exhibits the yearly revenue received from the sale of Cochituate water since its introduction into the city, October 25, 1848.

Received by Water Commissioners, as per Auditor's Report, in 1848 . . . . .	\$972 81
<i>Amount carried forward</i> . . . . .	<hr/> \$972 81

<i>Amount brought forward</i> . . . .				\$972 81
From January 1, 1849, to January 1, 1850, .				71,657 79
"	"	1850,	" 1851, .	99,025 45
"	"	1851,	" 1852, .	161,052 85
"	"	1852,	" 1853, .	179,567 39
"	"	1853,	" 1854, .	196,352 32
"	"	1854,	" 1855, .	217,007 51
"	"	1855,	" 1856, .	266,302 77
"	"	1856,	" 1857, .	282,651 84
"	"	1857,	" 1858, .	289,328 83
"	"	1858,	" 1859, .	302,409 73
"	"	1859,	" 1860, .	314,808 97
"	"	1860,	" 1861, .	334,544 86
"	"	1861,	" 1862, .	365,323 96
"	"	1862,	" 1863, .	373,922 33
"	"	1863,	" 1864, .	394,506 25
"	"	1864,	" 1865, .	430,710 76
"	"	1865,	" 1866, .	450,341 48
"	"	1866,	" 1867, .	486,538 25
"	"	1867,	" 1868, .	522,130 93
"	"	1868,	" 1869, .	553,744 88
"	"	1869, to May 1, 1869, .	.	562,031 33
				<hr/>
				\$6,854,933 29

Statement showing the number of houses, stores, steam-engines, etc., in the City of Boston, supplied with Cochituate water to the first of January, 1869, with the amount of water rates paid for 1868:

20,644 Dwelling-houses . . . .	\$268,833 62
4 Boarding-houses . . . .	129 00
105 Model-houses . . . .	2,630 00
1 Lodging-house . . . .	36 00
<hr/>	
<i>Amount carried forward</i> . . . .	\$271,628 62

<i>Amount brought forward</i>	.	.	.	.	\$271,628 62
6 Hotels	.	.	.	.	479 00
4,626 Stores and shops	.	.	.	.	42,772 05
200 Buildings	.	.	.	.	6,952 84
422 Offices	.	.	.	.	3,289 00
28 Printing-offices	.	.	.	.	285 47
18 Banks	.	.	.	.	239 50
27 Halls	.	.	.	.	312 34
1 Theatre	.	.	.	.	58 50
33 Private schools	.	.	.	.	340 17
18 Asylums	.	.	.	.	906 00
9 Greenhouses	.	.	.	.	77 50
63 Churches	.	.	.	.	702 21
3 Markets	.	.	.	.	889 00
128 Cellars	.	.	.	.	857 50
318 Restaurants and saloons	.	.	.	.	4,508 89
5 Club-houses	.	.	.	.	116 00
2 Bath-houses	.	.	.	.	210 00
38 Photographers	.	.	.	.	983 13
10 Packing-houses	.	.	.	.	311 00
1,082 Stables	.	.	.	.	7,792 45
12 Factories	.	.	.	.	426 08
6 Bleacheries	.	.	.	.	105 00
72 Bakeries	.	.	.	.	547 25
5 Ship-yards	.	.	.	.	69 50
3 Dry docks and engines	.	.	.	.	59 00
60 Shops	"	.	.	.	2,794 16
18 Stores	"	.	.	.	875 86
2 Foundries	"	.	.	.	98 30
6 Factories	"	.	.	.	326 40
5 Printing	"	.	.	.	249 60
1 Bakery	"	.	.	.	33 00
<i>Amount carried forward</i>	.	.	.	.	\$349,295 32



<i>Amount brought forward</i>	.	.	.	.	\$349,295 32
2 Ship-yards	"	.	.	.	55 00
4 Buildings	"	.	.	.	324 14
1 Pottery	"	.	.	.	50 00
2 Mills	"	.	.	.	245 52
50 Stationary	"	.	.	.	1,314 02
4 Armories	.	.	.	.	47 75
2 Gymnasiums	.	.	.	.	44 00
569 Hand-hose	.	.	.	.	3,205 00
14 Fountains	.	.	.	.	101 00
Gas Light Co. (filling gasometer).					372 90
Milldam Co.	.	.	.	.	370 80
Custom House	.	.	.	.	150 00
2 Ice Companies (washing ice)	.	.			75 00
59 Steamboats	.	.	.	.	11,370 34
Office (Harbor Master)	.	.	.		6 00
" city scales	.	.	.	.	9 00
Probate Building	.	.	.	.	47 50
House of reception	.	.	.	.	10 00
3 Fire-alarm meters	.	.	.	.	30 00
23 Fire-engines, hose and hook and ladder houses	.	.	.	.	500 00
282 Public Schools	.	.	.	.	1,932 00
City Stables	.	.	.	.	185 00
Offal Station	.	.	.	.	150 00
Steamer "Henry Morrison"	.	.			192 56
House of Correction	.	.	.		462 00
Public Library	.	.	.	.	50 00
Faneuil Hall	.	.	.	.	40 00
Shop (paving department)	.	.	.		9 00
Common Sewer Department, (making mortar, etc.)	.	.	.	.	56 00
<i>Amount carried forward</i>	.	.	.	.	<u>\$370,699 85</u>

<i>Amount brought forward</i>	.	.	.	.	\$370,699 85
Deer Park	.	.	.	.	10 00
Common and Squares	.	.	.	.	150 00
Public Urinals	.	.	.	.	145 00
Street sprinkling	.	.	.	.	400 00
Building purposes	.	.	.	.	3,088 97
Contractors for supplying shipping	.	.	.	.	1,628 29
Metered water (9 months)	.	.	.	.	134,216 42
					<hr/>
					\$510,338 73

*Statement showing the number and kind of Water Fixtures contained within the premises of Water-takers in the City of Boston to January 1, 1869, as compared with previous years.*

1866.	1867.	1868.	REMARKS.
4,774	5,074	5,129	Taps. These have no connection with any drain or sewer.
40,496	42,009	44,989	Sinks.
17,204	18,910	20,555	Wash hand-basins.
5,499	5,929	6,506	Bathing tubs.
7,398	7,789	8,702	Pau water-closets.
7,563	8,394	9,319	Hopper water-closets.
312	246	233	" " " pull.
239	297	292	" " " self-acting.
226	357	381	" " " waste.
536	571	554	" " " door.
1,790	1,968	2,128	Urinals.
6,365	6,806	7,686	Wash-tubs. These are permanently attached to the building.
756	759	782	Shower-baths.
13	14	17	Hydraulic rams.
773	711	703	Private hydrants.
350	388	391	Slop-hoppers.
33	40	46	Foot-baths.
94,327	100,352	108,363	

Respectfully submitted,

WM. F. DAVIS,

*Water Registrar.*

## REPORT OF THE SUPERINTENDENT OF THE EASTERN DIVISION.

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BOSTON, May 1, 1869.

NATHANIEL J. BRADLEE, Esq.,

*President Cochituate Water Board :*

My report for the year ending April 30th, I hereby respectfully submit.

The tables below show that during the year, 53,567 feet of main pipes, equal to about  $10\frac{1}{4}$  miles, have been laid in the city proper, South and East Boston, and the Southern, District and 1,342 service pipes, measuring 45,367 feet.

The number of leaks during the past season, notwithstanding the extensions, were not so great as during the previous year. The repairing of the East Boston Reservoir was commenced early last season, and abandoned at the close of the year, to be resumed at the opening of the present season. Late in the fall, the water was let in to test the efficiency of our operations, and I am pleased to say that with twenty feet of water, retained all winter, there was not the slightest indication of leakage. The work was resumed this spring as early as the weather would permit, and I have no doubt that in five weeks from the date of this report we will be able to fill again the reservoir to its overflow.

With the City Engineer, I examined, this spring, the box under the sidewalk of the Warren bridge, in which is the twenty-inch main that supplies East Boston, and found it much decayed, so much so as to require immediate attention, and learning that alterations and repairs of the bridge were in con-

templation, we sought an interview with the Mayor of Charleston, with a favorable result.

I have nothing to add to this report that I have not presented to the Board from time to time as the exigencies required.

One subject, however, let me urge to your notice—that of providing suitable departments in the immediate neighborhood of our works, for two or more workmen, that may be called upon with the least delay to attend to breakages and leaks that almost nightly occur. The nearest available workmen live upwards of a mile away, and the delay in getting them together to the locality required, may cause serious damage, to say nothing of the inconvenience.

Raised on Dedham Street, 422 feet 6-inch iron pipe, between Shawmut Avenue and Tremont Street.

Re-laid on Dedham Street, 237 feet 6-inch iron pipe, between Shawmut Avenue and Tremont Street.

Taken up 54 feet 4-inch iron pipe on Marion Street.

"	30	"	2-inch	"	"
"	590	"	1½-inch	"	"
"	199	"	1-inch lead pipe,	"	"
"	31	"	$\frac{3}{4}$ -inch	"	"

Lowered 5 feet  $\frac{5}{8}$ -inch lead pipes to usual depth to avoid post.

Extended  $\frac{5}{8}$ -inch pipe 566 feet.

*Statement of Location, Size and Number of Feet of Pipe laid in 1868.*

In what Street.	Between what Streets.	Diameter of Pipe in Inches.	Feet of Pipe,
<b>BOSTON PROPER.</b>			
Columbus Ave. . .	Worcester and W. Chester Park . . . . .	12	413
“ “ . .	Canton and Chandler Streets . . . . .	12	229
Dartmouth . . . .	Warren and Columbus Avenues . . . . .	6	522
Marlboro . . . .	Clarendon and Dartmouth . . . . .	6	216
E. Dedham . . . .	Albany and Harrison Avenue . . . . .	6	254
Union Park Street .	“ “ “ . . . . .	6	519
Chapman . . . . .	Village and Suffolk . . . . .	6	395
E. Brookline . . .	Albany and Harrison Avenue . . . . .	6	42
Kendall . . . . .	Tremont and Shawmut Avenue . . . . .	6	72
Brimmer . . . . .	Mt. Vernon and Pinckney . . . . .	6	180
Albany . . . . .	Springfield and E. Chester Park . . . . .	6	250
Oliver . . . . .	Milk and Pearl Place . . . . .	6	230
“ . . . . .	Pearl Place and Sturgis Place . . . . .	6	197
Chandler . . . . .	Clarendon and Berkeley . . . . .	6	108
“ . . . . .	“ Columbus Avenue . . . . .	6	74
Newton . . . . .	West of Columbus Avenue . . . . .	6	263
“ . . . . .	Columbus and Huntington Avenue . . . . .	6	117
Marlboro . . . . .	Clarendon and Dartmouth . . . . .	6	273
Wareham . . . . .	Albany and Harrison Avenue . . . . .	6	27
Fayette . . . . .	Pleasant and Ferdinand . . . . .	6	772
Marion . . . . .	“ “ . . . . .	6	765
			5,276
Clarendon Place .	Clarendon and Berkeley . . . . .	4	183
Chapman . . . . .	Chandler and Tremont . . . . .	4	176
Brimmer Place . .	From Essex . . . . .	4	165
Dartmouth “ . .	From Dartmouth Street . . . . .	4	164
Derby “ . .	Northampton and Lenox . . . . .	4	149
<i>Carried forward . . . . .</i>			837

*Statement of Location, Size, etc. — Continued.*

In what Street.	Between what Streets.	Diameter of Pipe in Inches.	Feet of Pipe.
	<i>Brought forward . . . . .</i>		837
Wareham . . . . .	Albany and Harrison Avenue . . . . .	4	27
Jefferson . . . . .	Tremont and Fayette . . . . .	4	118
Bay . . . . .	Church and Ferdinand . . . . .	4	118
			<hr/> 1,100
	<b>SOUTH BOSTON.</b>		
D Street . . . . .	Dexter and Ninth . . . . .	12	270
			<hr/> 270
Fifth . . . . .	O and P . . . . .	6	412
G . . . . .	Thomas and Seventh . . . . .	6	100
Sixth . . . . .	L and M . . . . .	6	473
H . . . . .	Fourth and Foundry . . . . .	6	168
M . . . . .	Fifth and Sixth . . . . .	6	175
Eighth . . . . .	E and D . . . . .	6	120
Ninth . . . . .	" " . . . . .	6	134
Ellery . . . . .	Dexter Street and Wadley Court . . . . .	6	86
Sixth . . . . .	L and M . . . . .	6	400
			<hr/> 2,068
Wadley Court . . . . .	. . . . .	4	114
Lark . . . . .	E and Dorchester . . . . .	4	222
			<hr/> 336
	<b>EAST BOSTON.</b>		
Saratoga . . . . .	Prescott and Chelsea . . . . .	6	333
London . . . . .	Porter and Marion . . . . .	6	113
			<hr/> 446
Marion . . . . .	Chelsea and Bremen . . . . .	4	160
			<hr/> 160

*Statement of Location, Size, etc. — Continued.*

In what Street.	Between what Streets.	Diameter of Pipe in Inches.	Feet of Pipe.
<b>BOSTON HIGHLANDS.</b>			
Tremont . . . . .	Through Washington to Eliot Square. “ Dudley Street to half way be- tween Adams and Mt. Pleasant Ave. . .	24	5,080
Dudley . . . . .	Dearborn and Hampden . . . . .	24	1,141
			6,221
Tremont . . . . .	Through Washington to Eliot Square. “ Dudley Street to half way be- tween Adams and Mt. Pleasant Ave. . .	12	5,080
Hampden . . . . .	Chadwick and Dudley . . . . .	12	1,910
Grove Hall Ave. . .	Dudley and Winthrop . . . . .	12	467
Dudley . . . . .	Hampden Street and Dorchester line. . .	12	1,374
“ . . . . .	Dearborn and Hampden . . . . .	12	1,216
Washington . . . .	So. Guild Row. Guild Row to Dudley. .	12	2,159
Shawmut Avenue . .	Dudley and Cedar . . . . .	12	2,062
Warren . . . . .	Dudley and Moreland . . . . .	12	980
Dearborn . . . . .	Dudley and Albany . . . . .	12	957
			16,155
Hampden . . . . .	Chadwick and Dudley . . . . .	6	156
Grove Hall Avenue .	Dudley and Winthrop . . . . .	6	12
Mt. Pleasant . . . .	“ and Grove Hall Ave. . . . .	6	2,118
Culvert . . . . .	Tremont and Cabot . . . . .	6	636
Cabot . . . . .	Culvert and Vernon . . . . .	6	190
Forrest . . . . .	Mt. Pleasant Ave. and Mt. Pleasant Ave. .	6	1,418
Cedar . . . . .	Centre and Shawmut Ave. . . . .	6	2,284
Highland . . . . .	Eliot Square and Hawthorne . . . . .	6	1,627
Centre . . . . .	Washington and Cedar . . . . .	6	1,544
Williams . . . . .	“ Shawmut Ave. . . . .	6	508
King Street . . . .	Elmwood and Nawn Place . . . . .	6	81
Elmwood . . . . .	King and Washington . . . . .	6	529
Hawthorne . . . . .	Cedar and Ellis . . . . .	6	300
Lambert . . . . .	Highland and Lambert Ave. . . . .	6	604
Shirley . . . . .	From Dudley Street . . . . .	6	164
	<i>Carried forward.</i> . . . . .		12,171

*Statement of Location, Size, etc. — Continued.*

In what Street.	Between what Streets.	Diameter of Pipe in Inches.	Feet of Pipe.
	<i>Brought forward</i> . . . . .	. . . . .	12,171
Greenville . . . .	Dudley and Winthrop . . . . .	6	210
Shawmut Avenue .	Hammond and Ruggles . . . . .	6	953
Madison . . . . .	Washington and Shawmut Avenue . . .	6	500
Bartlett . . . . .	Shawmut Avenue and Lambert . . . . .	6	377
Eustis . . . . .	Washington and Harrison Avenue . . .	6	360
Pierpont . . . . .	Station and Prentiss . . . . .	6	203
Station . . . . .	Tremont and Parker . . . . .	6	760
Swett . . . . .	Northampton and Pine Island . . . . .	6	773
Adams . . . . .	Hampden and Dudley . . . . .	6	1,038
Washington . . .	Guild Row and Eliot Square . . . . .	6	1,794
			<hr/> 19,139
Prescott Street . .	Hampden and Eustis . . . . .	4	330
Centre Place . . .	From Centre . . . . .	4	142
Nawn Place . . . .	" King . . . . .	4	108
Highland Place . .	" Highland . . . . .	4	161
Guild Street . . . .	" Shawmut Avenue . . . . .	4	476
Hilton Street . . .	" Swett . . . . .	4	299
			<hr/> 1,516
Willow Park . . . .	" Shawmut Avenue . . . . .	3	233
			<hr/> 233



## RECAPITULATION.

SECTION.	1868.	DIAMETER IN INCHES.				
		24.	12.	6.	4.	3.
Boston Proper . . .	Total number of feet laid . . . . .		642	5,276	1,100	
	Stopcocks in same . . . . .		1	14	8	
South Boston . . . .	Total number of feet laid . . . . .		270	2,068	336	
	Stopcocks in same . . . . .			6	6	
East Boston . . . . .	Total number of feet laid . . . . .			446	160	
	Stopcocks in same . . . . .			3	1	
Boston Highlands . .	Total number of feet laid . . . . .	6,221	16,155	19,139	1,516	238
	Stopcocks in same . . . . .	5	26	54	15	2
Sums of Pipes . . . . .		6,221	17,067	26,929	3,112	238
Sums of Stopcocks . . . . .		5	27	77	30	2

*Statement of the Length of different Sizes of Pipes laid, and Number of Stopcocks put in, to May 1st, 1869.*

	DIAMETER OF PIPES IN INCHES.										AGGREGATE.
	40.	36.	30.	24.	20.	16.	12.	8.	6.	4.	3.
Feet of Pipe laid in Brookline, Boston Highlands, and Boston Proper . . . . .	23,082	19,991	26,696	11,994		6,096	79,134	2,020	276,568	86,010	238
Number of Stopcocks in same . . . . .	4	6	8	15	1	19	147	5	589	308	2
Feet of Pipe laid in South Boston . . . . .					8,155		19,208	2,871	96,601	27,512	
Number of Stopcocks in same . . . . .					4		31	2	139	70	
Feet of Pipe laid in East Boston . . . . .					15,972	1,523	16,150		70,521	4,914	
Number of Stopcocks in same . . . . .					6	3	23		95	30	
Feet of Pipe laid in Newton and Needham . .		1,074	2,140				1,359		350		
Number of Stopcocks in same . . . . .							2		2		
TOTALS . . Length of Pipe laid . . . . .	23,082	21,065	31,836	11,994	24,127	7,619	115,851	4,891	444,050	118,436	238
Number of Stopcocks put in . .	4	6	8	15	11	22	203	7	825	408	2
											806,189 feet, equal to 152 miles, 629 ft. 1,511

*Statement of Service Pipe laid in 1868.*

Diam. in inches.	Boston Proper.		South Boston.		East Boston.		Boston Highl'ds.		Totals.	
	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.
2	1	116	...	...	...	...	...	...	1	116
1	14	693	2	55	...	...	7	609	23	1,357
$\frac{3}{4}$	5	113	...	...	...	...	8	639	13	752
$\frac{1}{2}$	489	17,861	214	6,590	62	2,088	239	8,541	1,004	35,080
$\frac{1}{2}$	66	1,760	117	2,813	55	1,697	63	1,792	301	8,062
Aggregate . . . . .									1,342	45,367
Making the total number up to May 1, 1869 . . . . .										28,266

*Repairs of Pipes during the Year 1868.*

WHERE.	DIAMETER OF PIPES IN INCHES.															Total.
	40.	36.	30.	20.	12.	6.	4.	2.	1½.	1.	¾.	½.	¼.	1.		
Boston . . . . .	1	5	2	2	10	22	29	5	57	7	5	269	7			421
South Boston . . . . .				2	1	1				2		41	9			56
East Boston . . . . .				2	1	1			3		1	34	2			44
Boston Highlands . . . . .					2	1	1					4	2			10
Totals . . . . .	1	5	2	6	14	25	30	5	60	9	6	348	20			531

Of the leaks that have occurred in pipes of 4 inches and upwards, 72 were on the joints, 6 by settling of earth, 3 by frost, 1 struck by pick. Total, 82.

Of 2 inches and in service pipes, 1 was on the joint, 108 by settling of earth, 6 by settling of wall, 33 by defective pipe, 5 by settling of drains, 33 by defective couplings, 1 by defective faucet, 7 by defective packings, 59 by stiff connections, 16 stopped

by fish, 15 by frost, 117 by rust, 6 by boxing, 9 by faucet broken at main, 5 by faucet loose at main, 3 by faucet pulled out, 16 struck by pick, 2 gnawed by rats, 3 by pipes not in use, 1 by digging of coal hole, 1 cut by chisel, 1 by driving pile, 1 by dirt in pipe. Total, 449.

*Statement of Number of Leaks, 1850-1868.*

YEAR.	DIAMETER OF		Total.
	Four Inches and Upwards.	Less than Four Inches.	
1850 . . . . .	32	72	104
1851 . . . . .	64	173	237
1852 . . . . .	82	241	323
1853 . . . . .	85	260	345
1854 . . . . .	74	280	354
1855 . . . . .	75	219	294
1856 . . . . .	75	232	307
1857 . . . . .	85	278	363
1858 . . . . .	77	324	401
1859 . . . . .	82	449	531
1860 . . . . .	134	458	592
1861 . . . . .	109	399	508
1862 . . . . .	117	373	490
1863 . . . . .	97	397	494
1864 . . . . .	95	394	489
1865 . . . . .	111	496	607
1866 . . . . .	139	536	675
1867 . . . . .	122	487	609
1868 . . . . .	82	449	531

HYDRANTS.

During the year, one hundred and fifty-one (151) new hydrants have been established, as follows:

In Boston Proper, Wilmarth, nineteen (19).

In South Boston, Wilmarth, seven (7).  
 " East Boston, " one (1).  
 " Boston Highlands, " sixteen (16).  
 " " " Lowry, one hundred and eight (108).

Total number of hydrants established up to May 1st, 1869:

Boston Proper . . . . .	1,048
South Boston . . . . .	345
East Boston . . . . .	198
Boston Highlands . . . . .	142
Brookline . . . . .	3
Charlestown . . . . .	11
Chelsea . . . . .	8
	<hr/>
	1,755

Twenty-three (23) hydrants have been taken out and replaced by new or repaired ones, and sixty-nine (69) boxes have been renewed. The hydrants have had the attention of former years paid them.

#### STOPCOCKS.

One hundred and forty-one (141) new stopcocks have been established this year, and forty-one (41) boxes have been renewed. All the stopcocks have had the usual attention paid them.

*Statement of Pipes and other Stock on hand, exclusive of Tools,  
May 1, 1869:*

NUMBER OF	DIAMETER IN INCHES.													
	48.	40.	36.	30.	24.	20.	18.	16.	12.	8.	6.	4.	3.	2.
Pipes . . . . .	101	17	15	80	27	41	3	28	938	3	940	288	21	30
Blow-off Branches . . . . .					4				7					
Y. Branches . . . . .				1				1			4			
3 Way-branches . . . . .	4	8	2	5	2	3		5	36	4	36	12	4	8
4 Way-branches . . . . .			1	2	2			2	22	7				
Flange Pipe . . . . .		2	2	3	3	2			2		7	1		
Sleeves . . . . .	10	5	4	2	11	2		3	38	2	46	50	10	8
Clamp Sleeves . . . . .	9	4	13	15½	2			3½	5		17	9	3	
Caps . . . . .		2	2	5		1		2	18	6	22	34		100
Reducers . . . . .	3	3	2		2			3	2		8	5		
Bevel Hubs . . . . .											7	2		
Curved Pipe . . . . .	5	1	3	14	11	5		3			22	28	1	
Quarter Turns . . . . .			2	2		5			7		18	12		3
Double Hubs . . . . .						4		9						50
Offset Pipes . . . . .									5		21	27	5	
Yoke Pipes . . . . .									8		5	7	9	
Man Hole Pipes . . . . .		2		2										
Eighth Turns . . . . .										2	18	3	2	
Pieces of Pipe . . . . .	1	4	2	10	12	12		3	16	1	21	22	2	
Stopcocks . . . . .		2	3	3	2	4		8	23	2	124	87	5	
Blow-off and Man-hole . .	1	1		2										

*Hydrants.* 207 Lowry hydrants, 88 Lowry hydrant frames and covers.

*Hydrants.* 16 new Wilmarth, 7 old Wilmarth, 11 old Lowell.

*For Hydrants.* 5 bends, 30 lengtheners, 7 frames, 40 covers, 32 plungers, 51 screws, 32 valve seats, 40 nipples, 31 socket nuts, 931 lbs. iron castings, 79 lbs. composition castings, 30 wastes, 6 wharf hydrants, 4 heavy frames and covers.

*For Stopcocks.* 2 36-inch screws, 1 30-inch ditto, 2 24-inch ditto, 1 20-inch ditto, 1 16-inch ditto, 1 4-inch screw for waste weir, 1 ditto for Brookline Reservoir (old), 37 composition screws, for 4 and 6-inch gates, 31 6-inch valves, 26 rings, 4 4-inch valves, 6 rings, 7,670 lbs. composition castings for 4 and 6 gates, 51 frames, 53 covers.

*Meters.* In shop, 1 3-inch, 8 2-inch, none 1-inch, 28  $\frac{5}{8}$ -inch.

*Stock for Meters.* 18 2-inch nipples, 38 1-inch ditto, 110  $\frac{5}{8}$ -inch ditto, 8 2-inch connecting pieces, 10 1-inch ditto, 24  $\frac{5}{8}$ -inch ditto, 20 1-inch locks, 28  $\frac{5}{8}$ -inch ditto, 34 ditto unfinished, 3 3-inch clocks, 1 2-inch ditto, 2 1-inch ditto, 3  $\frac{5}{8}$ -inch ditto, 8 brass spindles, 350 rubber nipples, 92 glasses, 42 lbs. composition castings, 16 fish boxes.

*For Service Pipe.* 17 1-inch union cocks, 18  $\frac{3}{4}$ -inch ditto, 38  $\frac{3}{4}$  unfinished ditto, 205  $\frac{5}{8}$ -inch cocks, 40  $\frac{1}{2}$ -inch ditto, 21 1-inch T cocks, 112  $\frac{5}{8}$ -inch thawing couplings, 10 2-inch coupling nuts, 26 2-inch female couplings, 5 male ditto, 6 2-inch hose couplings, 15 Y cocks, 69  $1\frac{1}{4}$ -inch male couplings, 7 female ditto, 31 1-inch female ditto, 7 male ditto, 36  $\frac{3}{4}$ -inch female and 12 male ditto, 170 boxes, 5 T boxes, 9 Y boxes, 25 extension tubes, 639 tubes, 70 caps.

*Lead Pipe.* 2,108 pounds 2-inch pipe, 1,920 pounds  $1\frac{1}{2}$ -inch ditto, 329 pounds  $1\frac{1}{4}$ -inch ditto, 1,045 pounds 1-inch ditto, 472 pounds  $\frac{3}{4}$ -inch ditto, 633 pounds of light  $\frac{3}{4}$ -inch ditto, 15,810 pounds  $\frac{5}{8}$ -inch ditto, 4,080 pounds  $\frac{1}{2}$ -inch ditto, 845 pounds old pipe, 75 pounds  $\frac{3}{4}$ -inch tin lined pipe, 172 pounds 1-inch ditto, 1,413 pounds  $\frac{1}{2}$ -inch ditto, 340 pounds  $\frac{5}{8}$ -inch ditto, 50 pounds solder, 30 pounds  $\frac{5}{8}$ -inch block-tin pipe, 25 pounds banca tin.

*Blacksmith Shop.* 310 pounds square iron, 881 pounds flat ditto, 731 pounds round ditto, 1,400 pounds working pieces, 335 pounds cast steel, 13,500 pounds Cumberland coal, 180 Pick blanks.

*Carpenter's Shop.* 100 feet of spruce boards, 300 feet pine ditto, 1,200 feet  $1\frac{1}{4}$ -inch spruce plank, 200 feet oak ditto, 2,300

feet 2-inch plank, 400 feet sheathing, 200 feet joist, 25 Lowry hydrant boxes, 75 hydrant boxes Wilmarth, 61 stopcock boxes 3 meter boxes, 25 meter boxes unfinished, 114 hydrant boxes unfinished, 8 stopcock boxes unfinished.

*Tools.* One steam engine, one large hoisting crane, two boom derricks, four hand geared ditto, four sets of shears, and rigging for same, five tool houses, tools for laying and repairing main and service pipes, two engine lathes, one fox ditto, one hand ditto, one upright drilling machine, three grindstones, the necessary tools for carrying on the machine, blacksmith, carpenter's and plumber's shops, one circular saw, one 40-inch proving press, one 36-inch ditto, one small ditto, also office furniture, and a large lot of patterns at the foundries where we obtain castings.

*Stable.* Five horses, four wagons, two buggies, two pungs, five sets harness, two sleighs, three tons English hay, twenty-six bushels grain.

*Beacon Hill Reservoir.* One large composition cylinder 16-inch jet, one 6-inch composition jet, three composition plates, nine cast-iron plates, two 4-inch composition jets, five swivel pipe patterns, one 2-inch copper straight jet, six composition jets for small fountains, six large composition cylinders, twenty drinking fountains.

*Miscellaneous.* 30 tons pig lead, 10 gallons linseed oil, 20 gallons tallow oil, 16,000 pounds furnace coal, 1 freight of gravel, 980 pounds gasket, 500 feet damaged hose, 2 kegs bolts, 10 reservoir gate covers, 5 manholes, 5 plates, lot of old iron, lot of old lumber, also old machinery from Marlboro'.

Respectfully submitted,

E. R. JONES,

*Supt. Eastern Division.*



## REPORT OF THE SUPERINTENDENT OF THE WESTERN DIVISION.

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CHESTNUT HILL RESERVOIR,  
BOSTON, May 14, 1869.

NATHANIEL J. BRADLEE, Esq.,  
*President Cochituate Water Board:*

SIR: During the past year no extensive repairs have been made on this division; the water has not been low enough to do any of the stone work that was proposed to be done, and the embankments and culverts remain in the same condition as last season. Some repairs have been made on the house at the lake, and the barn has been re-shingled, also repairs made on the fences so that they will answer this season. During the extraordinary freshet of February fifteenth, the embankment was washed away from the conduit on the Collins' Farm at Newton; no damage was done to the brick works, and a few hours' work with men and teams replaced the earth removed by the water, as the culvert at Course Brook was sufficient to take away the water without any trouble during the freshet; it will not be necessary to enlarge it at present; everything connected with the lake is in good order. No repairs have been made at the Brookline Reservoir the past year; the report of the annual examination of the conduit will be given by the City Engineer.

The following list of tools, etc., are used on this division, and stored at the Lake, and at Brookline Reservoir.

Respectfully submitted,

ALBERT STANWOOD,

*Supt. Western Division.*

## SCHEDULE OF PROPERTY ON WESTERN DIVISION.

1 horse, 1 carriage, 1 express wagon, 1 harness, 1 cart, 1 cart harness, 1 buffalo robe, 1 pung, 2 spades, 12 picks, 6 shovels, 6 wheelbarrows, 2 iron rakes, 2 hoes, 2 hay rakes, 2 bars, 4 rammers, 1 stone hammer, 2 claw hammers, 1 hand saw, 1 iron square, 1 drain mould, 1 manure fork, 2 hay forks, 1 pair hedge shears, 1 gravel screen, 1 axe, 2 pair rubber boots, 2 water pails, 1 stop-plank hook, 1 grindstone, 2 pair ice tongs, 4 wrenches, 1 stone roller, 1 sand sieve, 2 boats, 1 boat awning, 1 rain gauge, 1 cooking range, 1 extension table, 6 chairs, 1 wash stand, 1 map of Boston and its environs; the above named property is at the lake, and in charge of Mr. Richard Carroll.

## AT BROOKLINE RESERVOIR.

2 manure forks, 2 iron rakes, 2 sledge hammers, 2 picks, 2 bars, 1 hay rake, 1 scythe, 1 knife for cutting borders, 1 shovel, 1 bushel basket, 1 half-bushel ditto, 1 lantern, 1 stove, 1 wheelbarrow, 2 ladders.

## CIVIL ORGANIZATION OF THE WATER WORKS FROM THEIR COMMENCEMENT, TO MAY 1, 1869.

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### WATER COMMISSIONERS.

NATHAN HALE, JAMES F. BALDWIN, THOMAS B. CURTIS. From May 4, 1846, to January 4, 1850.

### ENGINEERS FOR THE CONSTRUCTION.

JOHN B. JERVIS, of New York, Consulting Engineer. From May 1846, to November 1848.

E. S. CHESBROUGH, Chief Engineer of the Western Division. From May 1846, to January 4, 1850.

WILLIAM S. WHITWELL, Chief Engineer of the Eastern Division. From May 1846, to January 4, 1850.

### CITY ENGINEERS HAVING CHARGE OF THE WORKS.

E. S. CHESBROUGH, Engineer. From November 18, 1850, to October 1, 1855.

GEORGE H. BAILEY, Assistant Engineer. From January 27, 1851, to July 19, 1852.

H. S. McKEAN, Assistant Engineer. From July 19, 1852, to October 1, 1855.

JAMES SLADE, Engineer. From October 1, 1855, to April 1, 1863.

N. HENRY CRAFTS, Assistant Engineer. From October 1, 1855, to April 1, 1863.

N. HENRY CRAFTS, City Engineer. From April 1, 1863, to the present time.

THOMAS W. DAVIS, Assistant Engineer. From April 1, 1863, to December 8, 1866.

HENRY M. WIGHTMAN, Resident Engineer at C. H. Reservoir. From February 14, 1866, to the present time.

After January 4, 1850, Messrs. E. S. CHESBROUGH, W. S. WHITWELL and J. AVERY RICHARDS, were elected a Water Board, subject to the direction of a Joint Standing Committee of the City Council, by an ordinance passed December 31, 1849, which was limited to keep in force one year; and in 1851 the Cochituate Water Board was established.

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### COCHITUATE WATER BOARD.

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#### PRESIDENTS OF THE BOARD.

THOMAS WETMORE, elected in 1851, and resigned

April 7, 1856 . . . . . Five years.

JOHN H. WILKINS, elected in 1856, and resigned

June 5, 1860 . . . . . Four Years.

EBENEZER JOHNSON, elected in 1860, term expired

April 3, 1865 . . . . . Five Years.

OTIS NORCROSS, elected in 1865, and resigned

January 15, 1867 . . . . . One year and nine months.

JOHN H. THORNDIKE, elected in 1867, term expired

April 6, 1868 . . . . . One year and three months.

NATHANIEL J. BRADLEE, elected from April 6,

1868, to present time.

#### MEMBERS OF THE BOARD.

THOMAS WETMORE, 1851, 52, 53, 54, and 55 . . . . . Five years.

JOHN H. WILKINS, 1851, 52, 53, \*56, 57, 58

and 59 . . . . . Eight years.

HENRY B. ROGERS, 1851, 52, 53, *54 and 55	Five years.
JONATHAN PRESTON, 1851, 52, 53 and 56	Four years.
JAMES W. SEVER, 1851 . . . . .	One year.
SAMUEL A. ELIOT, 1851 . . . . .	One year.
JOHN T. HEARD, 1851 . . . . .	One year.
ADAM W. THAXTER, Jr., 1852, 53, 54, and 55	Four years.
SAMPSON REED, 1852 and 53 . . . . .	Two years.
EZRA LINCOLN, 1852 . . . . .	One year.
THOMAS SPRAGUE, 1853, 54 and 55 . . . . .	Three years.
SAMUEL HATCH, 1854, 55, 56, 57, 58 and 61	Six years.
CHARLES STODDARD,* 1854, 55, 56 and 57	Four years.
WILLIAM WASHBURN, 1854 and 55 . . . . .	Two years.
TISDALE DRAKE, 1856, 57, 58 and 59 . . . . .	Four years.
THOMAS P. RICH, 1856, 57 and 58 . . . . .	Three years.
JOHN T. DINGLEY, 1856 and 59 . . . . .	Two years.
JOSEPH SMITH, 1856 . . . . .	Two months.
EBENEZER JOHNSON, 1857, 58, 59, 60, 61, 62, 63 and 64 . . . . .	Eight years.
SAMUEL HALL, 1857, 58, 59, 60 and 61 . . . . .	Five years.
GEORGE P. FRENCH, 1859, 60, 61, 62 and 63 . . . . .	Five years.
EBENEZER ATKINS, 1859 . . . . .	One year.
GEORGE DENNY, 1860, 61, 62, 63, 64 and 65 . . . . .	Six years.
CLEMENT WILLIS, 1860 . . . . .	One year.
G. E. PIERCE, 1860 . . . . .	One year.
JABEZ FREDERICK, 1861, 62 and 63 . . . . .	Three years.
GEORGE HINMAN, 1862 and 63 . . . . .	Two years.
JOHN F. PRAY, 1862 . . . . .	One year.
J. C. J. BROWN, 1862 . . . . .	One year.
JONAS FITCH, 1864, 65 and 66 . . . . .	Three years.
OTIS NORCROSS,* 1865 and 66 . . . . .	Two years.
L. MILES STANDISH, 1860, 61, 63, 64, 65, 66 and 67 . . . . .	Seven years.

JOHN H. THORNDIKE, 1864, 65, 66 and 67	Four years.
CHARLES R. McLEAN, 1867	One year.
BENJAMIN F. STEVENS, 1866, 67 and 68	Three years.
WILLIAM S. HILLS, 1867	One year.
CHARLES R. TRAIN, 1868	One year.
NATHANIEL J. BRADLEE, 1863, 64, 65, 66, 67, 68, 69,	} <i>Present Board.</i>
ALEXANDER WADSWORTH, 1864, 65, 66, 67, 68, 69,	
BENJAMIN JAMES,* 1858, 68 and 69,	
GEORGE LEWIS, 1868 and 69,	
JOSEPH M. WIGHTMAN, 1868 and 69,	
CHARLES H. ALLEN, 1869,	
FRANCIS A. OSBORN, 1869,	

\* Mr. John H. Wilkins resigned November 15, 1854, and Charles Stoddard was elected to fill the vacancy. Mr. Henry B. Rogers resigned October 22, 1865. Mr. Wilkins was re-elected February 1856, and chosen President of the Board, which office he held until his resignation on June 5, 1860, when Mr. Ebenezer Johnson, was elected President; and on July 2d, Mr. Miles Standish was elected to fill the vacancy occasioned by the resignation of Mr. Wilkins. Otis Norcross resigned January 15, 1867, having been elected Mayor of the City. Benjamin James served one year in 1858, and was re-elected in 1868.

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### COCHITUATE WATER BOARD, 1869.

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NATHANIEL J. BRADLEE, President.

BENJAMIN JAMES, of the Board of Aldermen.

ALEXANDER WADSWORTH, }  
FRANCIS A. OSBORN, } Of the Common Council.

AT LARGE.

For One Year.

GEORGE LEWIS,  
JOSEPH M. WIGHTMAN.

For Two Years.

NATHANIEL J. BRADLEE,  
CHARLES H. ALLEN.

CLERK.

SAMUEL N. DYER.

SUPERINTENDENT OF THE EASTERN DIVISION.

EZEKIEL R. JONES.

SUPERINTENDENT OF THE WESTERN DIVISION.

ALBERT STANWOOD.

WATER REGISTRAR.

WILLIAM F. DAVIS.

CITY ENGINEER.

N. HENRY CRAFTS.

RESIDENT ENGINEER, CHESTNUT HILL RESERVOIR.

HENRY M. WIGHTMAN.

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STANDING COMMITTEES OF THE BOARD.

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EASTERN DIVISION.

GEORGE LEWIS, Chairman.

JOSEPH M. WIGHTMAN, FRANCIS A. OSBORN.

WESTERN DIVISION.

ALEXANDER WADSWORTH, Chairman.

CHARLES H. ALLEN, BENJAMIN JAMES.

WATER REGISTRAR'S DEPARTMENT.

JOSEPH M. WIGHTMAN, Chairman.

BENJAMIN JAMES, CHARLES H. ALLEN.

ON CONSTRUCTION OF CHESTNUT HILL RESERVOIR.

NATHANIEL J. BRADLEE, Chairman.

ALEXANDER WADSWORTH, GEORGE LEWIS.

CLERK OF COMMITTEES.

WILLIAM C. PHELAN.

## RULES AND REGULATIONS OF THE COCHITUATE WATER BOARD.

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### COCHITUATE WATER BOARD.

The persons chosen by the City Council to constitute the Cochituate Water Board shall meet on the first Monday in April, in each year, and organize themselves by the choice of a President from their own number, and of a Clerk by ballot, and shall make such rules and regulations for their own government, and in relation to all subordinate officers, as they may deem expedient.

### DUTIES OF THE PRESIDENT.

The President shall preside at all meetings of the Board and in his absence a President *pro tem* shall be chosen. He shall exercise a general supervision over all the water works, and the materials and property connected therewith, and over all subordinate officers and agents of the Board. He shall sign all contracts, deeds and other instruments authorized by the Board. He shall sign the monthly draft on the treasury, and deliver it, with the vouchers, to the Auditor, previous to the 20th of each month.

At the annual, or the next meeting thereafter of the Board, the President shall appoint the following standing Committees, consisting of three members each, who shall have the special care and control of the several departments to which they are appointed, viz :

Committee on the Western Division.

Committee on the Eastern Division.



Committee on the Water Registrar's office, and the office of the Water Board.

Also, such special committees as may be required or deemed advisable.

#### COMMITTEES.

All petitions and subjects presented to the Board, shall (unless they are prepared to act thereon) be referred to a committee, to be reported upon at the next regular meeting, or at a special meeting called for the purpose. All bills and accounts incurred by direction of the several committees must be examined and approved by the Chairman, or, in his absence, by a member of the committee. Committees shall report upon all matters referred to them at the next succeeding meeting of the Board, unless full powers are conferred by vote of the Board. All business referred by the Board to any standing or special committee shall be acted upon and disposed of only at a meeting of the committee.

#### MEETINGS.

Stated meetings of the Board shall be held semi-monthly, at such day and hour as they may direct. Special Meetings may be called by the President, or by any two members. A majority of the Board shall constitute a quorum. The order of business shall be as follows :

Reading the record.

Reports of Committees.

Examination of Claims.

Motions and Resolutions.

All meetings of the Board shall be notified, by the Clerk sending a notice to the residence of each of the members, unless otherwise directed. When requested by a member of the Board the vote shall be taken by yeas and nays, and recorded by the Clerk.

## DUTIES OF THE CLERK.

The Clerk shall be chosen by ballot, and be duly sworn to the faithful performance of the duties of his office. He shall give his whole time to the service of the Board, attend their meetings, and keep a record of their proceedings. He shall receive all bills and accounts incurred by the Board, examine them in detail, and when indorsed by the authorized person and Chairman of the Committee as correct, shall present them, with a schedule thereof, to the President for his approval, after which he shall enter them in their proper books and upon the monthly draft. He shall receive all applications for extension of service pipes, and for water to be let on or shut off, and keep a record of the same, specifying the time and reasons therefor; cause the water to be let on when the rates or fines are paid, and when notified by the Registrar of non-payment, at once cause it to be shut off. He shall have charge of the books, plans, and documents, belonging to the Board, and shall also perform such further services as, from time to time, may be required by the President or the Board.

## CLERK OF COMMITTEES.

The Clerk of Committees shall be chosen by ballot, and it shall be his duty to notify all meetings of committees; be present at the meetings and keep a record of their proceedings, in separate books for each committee. He shall keep a list of, and the papers relating to, the business referred to each committee by the Board, for the information and use of the committee. He shall also copy in proper books all contracts, deeds of land, claims allowed for damages, leases and other important papers on business connected with the Board; and perform such other clerical duties as may be required by the President or Committees.

## OFFICERS.

On the first Monday in April, or within thirty days thereafter, the following subordinate officers shall be elected by ballot, to hold their offices during the pleasure of the Board, and they shall receive such compensation as the Board may from time to time deem proper, viz :

A Superintendent of the Western Division.

A Superintendent of the Eastern Division.

The Board may also elect or appoint, from time to time, such clerks, agents, and assistants as they may deem necessary.

## WESTERN DIVISION.

The Superintendent, under the direction of the President and the Committee on the Western Division, shall have the charge of Lake Cochituate, Brookline and Chestnut Hill Reservoirs, gate-houses and pipe-chambers at Charles River, and of all the lands and property of the city in this division.

It shall be his special duty to attend to the protection of the above lands and property ; the waste weirs at Dedman's Brook in Needham, Webber's Barn in Brookline, at Newton Centre and East Needham ; to the prevention of all nuisances and trespasses upon all the said works or lands, or upon the waters of the lake ; keep the grounds and walks in good order, and forthwith report to the Committee, and at the office, all cases of damage or casualty ; make an accurate record of the water levels at the lake every morning, specifying therein the depth of the water in the conduit, the height of the surface of the lake above the conduit, the temperature of the water in the gate-house, of the air in the shade, and the height of the water on the 23-feet gauge below the outlet dam ; also at the Brookline and Chestnut Hill Reservoirs, specifying therein the depth of the water above the bottom of the conduit in the reservoirs, the depth in the gate-houses, the temperature of the water

and of the air in the shade; ascertain the height of water at the pipe-chambers at Charles River daily, every morning, above the bottom of the aqueduct, and report the same to the Board weekly, and to the City Engineer monthly; employ such assistants and laborers as may be required, first obtaining the consent and approval of the Committee on this division. He shall annually, on the first of May, return to the Board a full report of the work and labor performed, and materials used in his department, and a correct statement of all the tools and other property in his possession belonging to the city, and perform such further services as may be required.

#### EASTERN DIVISION.

The Superintendent, under the direction of the President and the Committee on the Eastern Division, shall have the special charge of the machine shop, pipe yards, all the reservoirs, and of the public fountains in the city, and of all the iron mains and pipes in both divisions; and it shall be his duty to protect them from all nuisances and trespasses, and attend to the protection of all other property in this division belonging to the Water Works. He shall keep an account of the pipes, machinery, and other property in the machine shop and yards, and in case of accident to the mains or other pipes, forthwith repair them, distributing suitable notices before the stoppage of water, except in cases of emergency; give immediate notice at the office and to the Committee of any accident which may happen to the mains, pipes, or anything connected therewith; put in such service pipes, and lay such mains and other pipes, as may from time to time be directed; repair any injuries to the streets or sewers caused by the Water Works; employ such assistants and laborers as may be required, first obtaining the consent and approval of the Committee; whenever any street, highway, or place is liable to be obstructed or rendered dangerous by the laying of pipes or making repairs, cause a sufficient fence to be

erected, and light and guard the same; make a full report annually to the Board of the work and labor performed, and materials used in his department; measure the quantity of water in the reservoirs; take the temperature of the water in the Beacon Hill Reservoir, and of the air in the shade, every morning, noon and night, and keep a record and make a return thereof to the Board weekly, and to the City Engineer monthly; duly return to the Board, on the first of May in each year, and as much oftener as they may require, a correct statement of the quantity of pipes and other materials in the yards, and all the property belonging to the city which is under his care, and perform such further services as may be required.

#### CITY ENGINEER.

It shall be the duty of the City Engineer to carefully inspect the aqueduct and all other structures belonging to the Water Works, in person, previous to making his annual report to the Board, and at such other times as they may require; make such surveys, plans, and estimates, connected with the works, as the Board may direct; when requested, give his opinion, in writing, of the best mode of constructing or repairing any portion of the works; keep in his office the returns of the Superintendents in relation to the water levels at the lake, the reservoirs, and the pipe-chambers at Charles River, and report them to the Board on the first day of May in each year.

#### WATER REGISTRAR.

It shall be the duty of the Water Registrar, under the direction of the Board and the Committee on this department, to assess the water rates, according to the tariff established by the City Council; make out and distribute all bills for the same; exercise a constant supervision over the use of the water, and attend to the enforcement of all regulations relative thereto;

keep suitable books, in which shall be entered the names of all persons who take water, the kind of building, the name and number of the street, the nature of the use, the number of taps, and the amount charged, which shall always be open to the inspection of the Board ; make returns to the Clerk of the Board, of all places where the water is to be let on, and where to be shut off for non-payment, with full particulars as to the location of the premises ; make monthly returns to the Board of the receipts and expenditures of his department, and as much oftener as they may require. He shall annually, on the first of May, report to the Board the number of water-takers ; the amount received for water-rates ; the number of meters used and applied during the year ; the number and kind of water-fixtures ; and a classified list of the buildings and the purposes for which the water is used. He shall employ such assistance as may be necessary in his department, first obtaining the approval of the Committee, and perform such other services as may be required.

He shall make no abatement of water rates after a bill has been rendered, nor apply any meter, or discontinue the use of any, without the approval of the President or the Committee.

#### BILLS AND ACCOUNTS.

All bills and accounts authorized by this Board, after being, approved by the Chairman of the Committee ordering the same, shall be presented to the President by the Clerk, previous to the twentieth of each month ; and after the same shall have been approved by the President, they shall be entered by the Clerk in the proper books ; and a monthly draft for the amount shall be signed by the President, and delivered with the vouchers to the City Auditor.

All bills and accounts to be entered in the monthly draft must be delivered to the Clerk on or before the fifteenth day of that month.

## AMENDMENTS.

The foregoing Rules and Regulations may be suspended by vote of a majority of the members present, and they may be amended by a majority of the whole Board; notice of the proposed amendments having been given at the previous meeting of the Board.

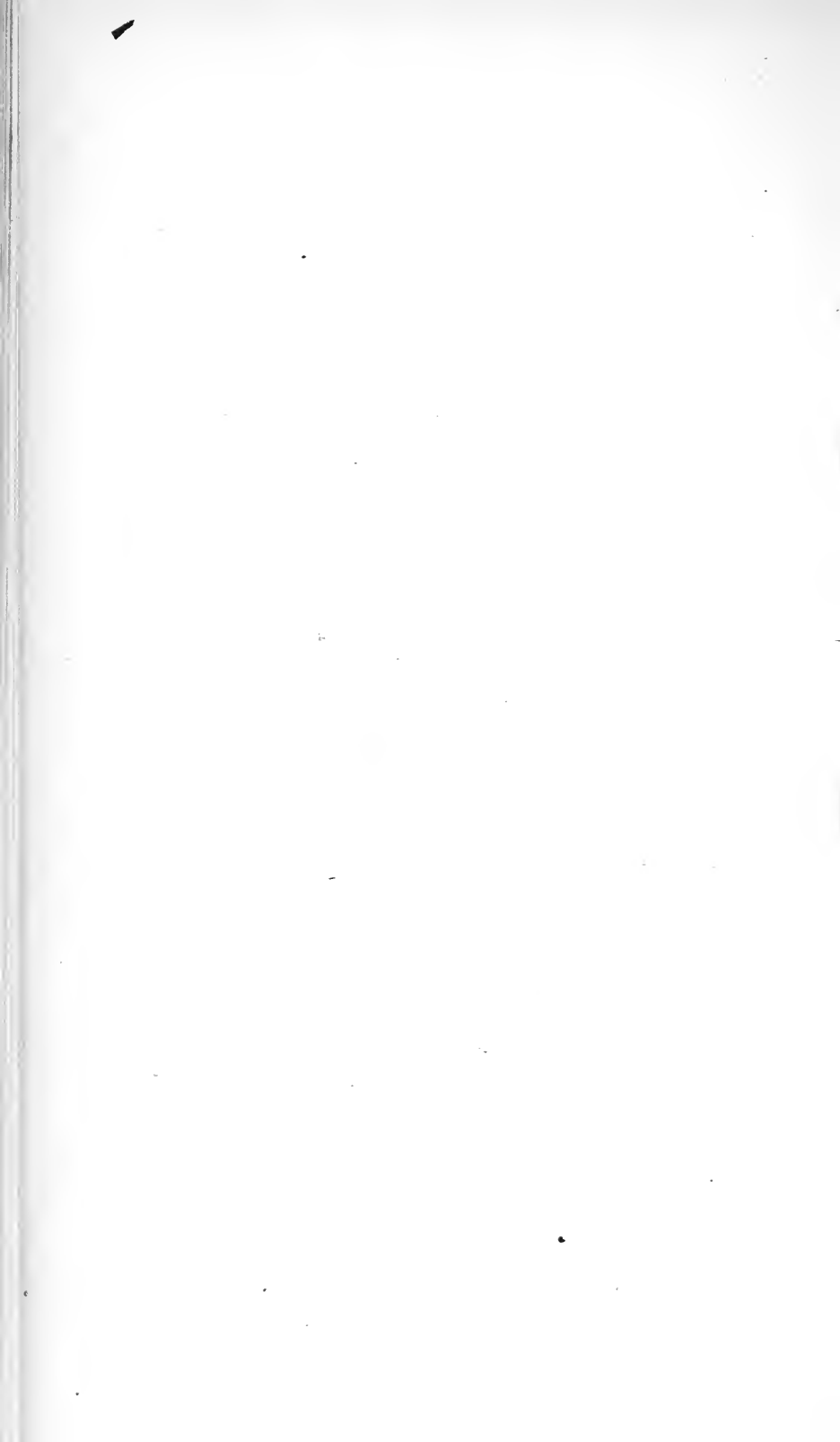
















PUBLIC LIBRARY  
OF THE  
CITY OF BOSTON.

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**ABBREVIATED REGULATIONS.**

One volume can be had at a time, in home use, from the Lower Hall, and one from the Bates Hall.

Books can be kept out 14 days, and renewed once, if application for renewal is made before the fourteen days elapse.

A fine of 2 cents for each volume will be incurred for each day a book is detained more than 14 days, and no book can be obtained until all fines are settled.

Any book detained more than a week beyond the time limited, will be sent for at the expense of the delinquent.

No book is to be lent out of the household of the borrower; nor is it to be kept by transfers in one household more than one month, and it must remain in the library one week before it can be again drawn in the same household.

The Library hours for the delivery and return of books are from 9 o'clock, A. M., to 8 o'clock, P. M., in the Lower Hall; and from 9 o'clock, A. M., until 6 o'clock, P. M., from October to March, and until 7 o'clock, from April to September, in the Bates Hall.

Every book must, under penalty of one dollar, be returned to the Library at such times as shall be publicly announced.

The card must be presented whenever a book is returned. For renewing a book, a new slip giving the shelf numbers of the book must be made, and the card must be presented with the slip.

MARCH, 1869.

